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The Outlook

Remembering the Living

MONDAY next marks the beginning of Battle-of-Britain Week, and the various events which are planned, such as fly-pasts of large formations, and opening to the public a number of Royal Air Force stations, will serve as a reminder of what the nation owes to those gallant few who stood between us and invasion in that grim September of 1940. That debt we shall forget at our peril.

A more permanent memorial is formed by the scroll bearing the names of those who died, and by the window of remembrance in the Royal Air Force Chapel in Westminster Abbey. Between them, these two memorials immortalize the names of the dead and, by means of the crests worked into the design of the window, the living squadrons of the R.A.F.

In our remembrance of those who gave so unstintingly everything they had, even life itself, we should not forget those whom they left behind, nor the many who survived the ordeal but upon whom that ordeal has left scars which can never be effaced. To them also do we owe a debt of honour as great as, and more material than, that so richly earned by those who gave their lives in the heat of battle.

Many are condemned by wounds and injuries to a life of pain and suffering, with only the memories of their "Greatest Hour" to sustain them. They and their families deserve all the help we can give them towards making life bearable. Of those who gave their lives that we might live, many left dependents in straitened circumstances. For the sake of the dead, who grudged not their sacrifice, but whose one great anxiety was for those dear to them, we must see to it that their trust is not in vain.

There is no better nor more practical way of justifying that trust than by contributing to the Royal Air Force Benevolent Fund. That organization has done and is doing magnificent work in helping those who have fallen by the wayside; who for one reason or another, through no fault of theirs, are deprived of the means for living as they are entitled to live; who have children whose education is a problem. In those and many other ways the R.A.F. Benevolent Fund is deserving of all help that any of us can give.

The cover of this week's issue, symbolic in its design, has been presented by Rolls-Royce to the R.A.F. Benevolent Fund; a gesture worthy of a great name. We hope many others will follow that splendid example. But help in the form of money is also needed. So let all of us make a Battle-of-Britain resolution to contribute something, as much as our means will allow, towards maintaining and increasing the scope of the great task which that organization has undertaken. In so doing we shall, in some small measure, prove ourselves worthy of the trust not only of "The Few" but of those who carry on the great tradition which they established.

Shop Window 1947

RADLETT is the word on everyone's tongue in aviation this week. There, statically and aerodynamically, the British aircraft industry, or at least that part of it which qualifies for membership of the Society of British Aircraft Constructors, shows to the thousands of invited representatives of this and other countries what it has to contribute to the world's progress in aviation. And a very fine contribution it is.

Last week we expressed our regret that the British taxpayer is not allowed to see for himself the wonderful products for which he helps to pay. Partly for his benefit, and also in order to give our many visitors from overseas a lasting record of British aviation material, we have made this week's issue a survey of the aircraft industry. In planning the pages we have tried to present the information, factual and pictorial, in as convenient a form as possible, so that the issue should not only be attractive to the eye but of practical usefulness

as a work of reference, to be consulted and studied later at leisure. How far we have succeeded in achieving our aim must be left to our readers to decide.

The issue is divided into logical sections, each dealing with separate subjects such as power units, military aircraft and civil aircraft. In that way the reader will be able to turn at once to the particular subjects which interest him, without having to hunt through a large number of irrelevant pages for the information he seeks.

Aircraft equipment, using the expression in its widest sense, is of a less spectacular character than aircraft and engines, but it is every bit as essential to the proper functioning of flying. A section devoted to this aspect of the industry gives an idea of the enormous scope covered and the variety of materials and equipment necessary before an aircraft can become airborne.

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Petrol

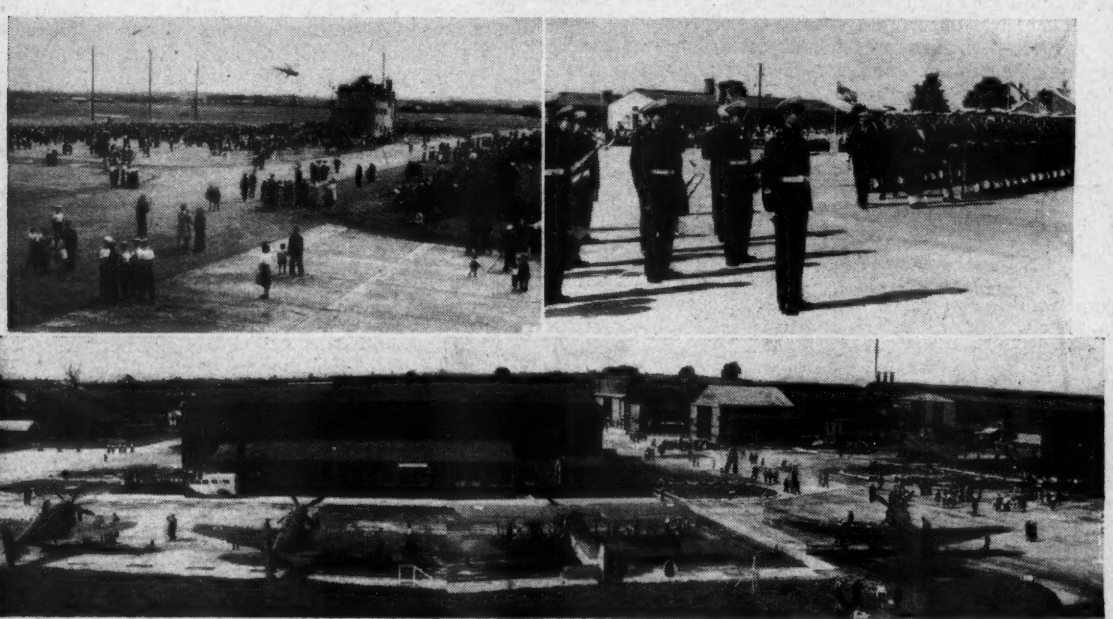
IT is rather surprising that the abolition of the basic petrol ration for private road vehicles has been accepted with so little comment or fuss. The stoppage of so small a leak in the dollar bucket—a bucket which has proved to be closely related to the colander—seems scarcely worth while in view of the tremendous inconvenience, discomfort, loss of time and over-crowding of public transport it must cause. When the new restrictions, coinciding with winter, come into force it may be that people will view the matter less apathetically and perhaps suggest more effective and practical means of conserving dollars.

Private owners of aircraft have fortunately been spared the petrol chop, and indications are that the allowance will not be reduced by more than 10 per cent, if at all. The belief is that very few flights are made for pleasure alone, and those few that might have been contemplated will be prevented by the difficulties and time involved in getting to airfields without some form of private transport, by the currency ban on foreign holidays, and often (for the next six months) by the weather. It remains to be seen how much the activities of the flying clubs will be affected by transport difficulties. Certainly they cannot fail to suffer.

There is one bright spot in the fuel outlook, namely, the return on January 1st to the distribution of branded petrols following the dissolution of the Petroleum Board. The effect will be felt about Easter time, when existing stocks of "pool" have been exhausted and named petrol of higher grade can again be marketed.

The three Services have announced the decision to introduce at once a petrol-rationing system, and in the case of the Royal Air Force a substantial saving is to be made, starting this month. All Home Commands except Maintenance are aiming to make a 10 per cent cut in the consumption of their road vehicles, and since the annual consumption of Home Commands alone is about twelve million gallons, rather more than one million should be saved.

There is obviously less chance of effecting a saving in aviation fuel, as flying hours have already been reduced to the minimum commensurate with efficiency due to the acute shortage of servicing personnel.

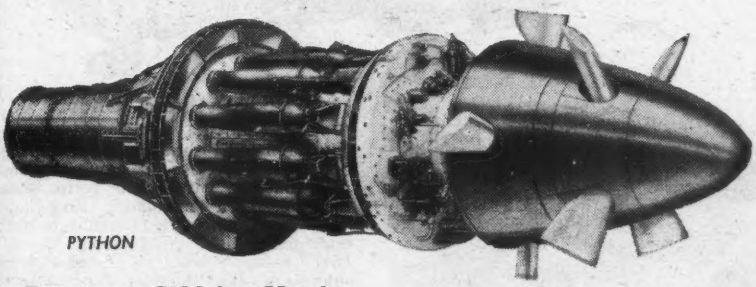


NAVAL AIR DAY: The West Country was treated to a fine exhibition and air display at R.N.A.S., Yeovilton on September 6th. (Top left) The Westland-Sikorsky S.51 provided a large crowd with both interest and amusement. (Top right) Inspection by Admiral of the Fleet Sir James F. Somerville, who opened the proceedings. (Below) Visiting aircraft, before demonstrating, were parked for inspection. They included Sea Hornet, Sea Fury, Firebrand, and an old Swordfish. An account of the events appears on page 292.

BRITISH POWER UNITS

Pure Jet and Airscrew Turbine Designs : Piston Engines of All Sizes

IN the previous issue of "FLIGHT" specially prepared tables of data relating to all current aircraft engines were given. These included details of layout, capacity, power output and dimensions. Mention was also made of several new gas turbines and one or two piston engines for which full details will become available later. On these pages we now give additional information and illustrations of British engines to supplement the data tables.



PYTHON

Armstrong Siddeley Python

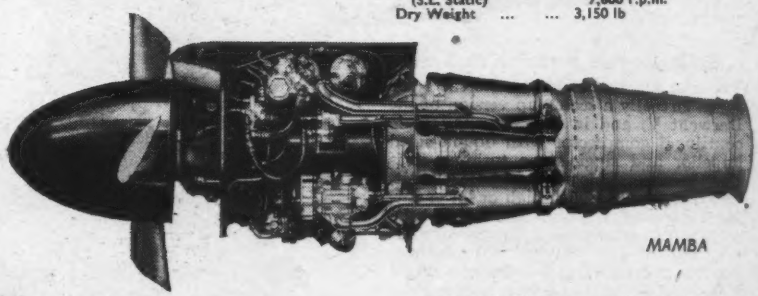
MOST powerful airscrew turbine announced so far, the Python has now been under development for many months. It may be expected soon to commence flight trials—perhaps late this year. A number of possible installations have been studied for both military and civil aircraft. Many hours of test running have been completed against the brake and with airscrew fitted.

Combustion Chambers...	11
Compressor type ...	1 axial
Max Power (S.L. Static)	1,150 lb thrust, 3,670 s.h.p., 8,000 r.p.m.
Recommended Cruising (S.L. Static)	950 lb thrust, 2,720 s.h.p., 7,600 r.p.m.
Dry Weight	3,150 lb

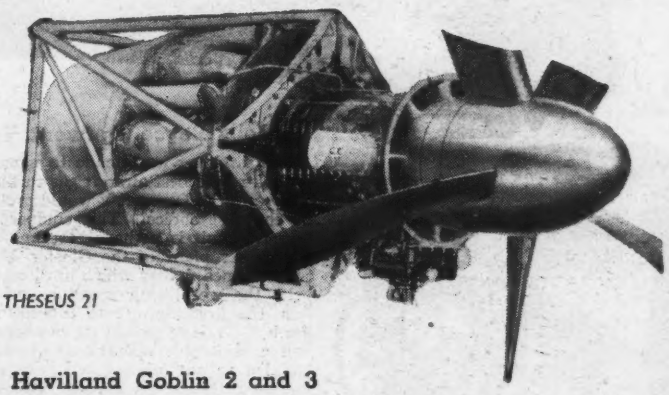
Armstrong Siddeley Mamba

ONE of the first small airscrew turbines to be completed, the Mamba, like the Python, is at present undergoing intensive development. So far only brief details and initial power figures have been released. The Mamba may be used to power new jet trainers, and details of the installation of two in the Miles Marathon have been worked out.

Combustion Chambers	6
Compressor type ...	1 axial
Max Power (S.L. Static)	320 lb thrust, 1,010 s.h.p., 14,500 r.p.m.
Recommended Cruising	265 lb thrust, 747 s.h.p., 13,750 r.p.m., S.L. Static
Weight	750 lb



MAMBA



THESEUS 21

Bristol Theseus 11 and 21

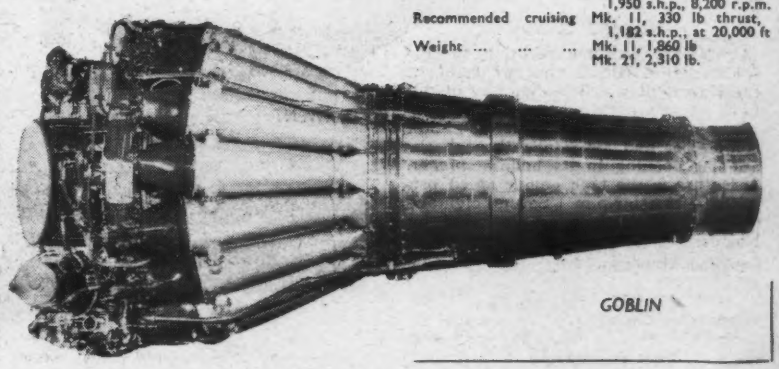
BY satisfactorily completing its 150-hour official test run the Theseus 11 gains the distinction of being the first airscrew turbine in the world to hold a type certificate. It is the most advanced in development of all airscrew turbines and has several novel features, among which are the complete separation of the turbine which drives the airscrew from that which is connected to the compressor. For long-range work a heat exchanger can be fitted which gives a marked reduction in fuel consumption in the region of 35 g.p.h. for cruising. The weight penalty on this mark 21 version is 450 lb.

Combustion Chambers...	8
Compressor type ...	1 axial, 1 centrifugal
Max continuous power S.L. Static	Mk. 11, 600 lb thrust, 2,180 s.h.p., 8,200 r.p.m. Mk. 21, 500 lb thrust, 1,950 s.h.p., 8,200 r.p.m.
Recommended cruising	Mk. 11, 330 lb thrust, 1,182 s.h.p., at 20,000 ft
Weight	Mk. 11, 1,860 lb Mk. 21, 2,310 lb.

De Havilland Goblin 2 and 3

ONE of the first and most successful pure jet units produced in this country, the Goblin, with its characteristic whine, is familiar in many countries, together with the Vampire fighter which it powers. Features of the engine are its sturdy simplicity and its large, single-sided impellor to which air is fed directly with full ram effect from forward-facing intakes. The latest high-rated version, the Mark 3, has been produced primarily as the power unit of the D.H.108 research aircraft.

Combustion Chambers...	16
Compressor type ...	1 centrifugal
Max Power (S.L. Static)	3,000 lb. thrust, 10,200 r.p.m.
(Mk. 3) ...	3,300 lb. thrust, 10,750 r.p.m.
Recommended cruising (S.L. Static) (Mk. 3) ...	1,850 lb thrust, 8,700 r.p.m. 2,240 lb thrust, 9,500 r.p.m.
Weight	1,573 lb



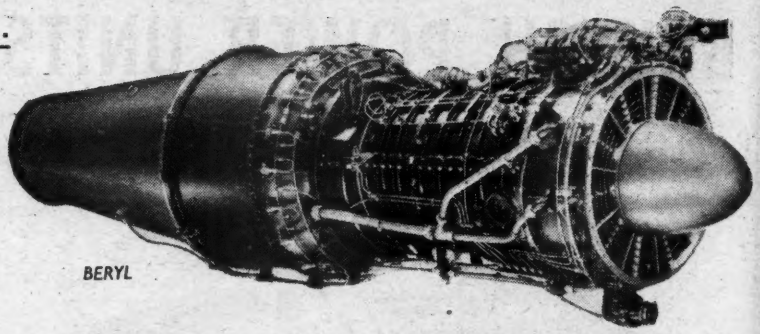
GOBLIN

British Power Units . . . . .

Metropolitan-Vickers Beryl

EARLIER this year the F.2/4A, or Beryl as it has been named, was rerated after successful test runs at 3,850 lb thrust. This engine is unique among British units in having a single annular combustion chamber. An important stage in the further development of the Metrovick Beryls was the first flight of the Saunders-Roe fighter which has a pair of these units installed in the hull. The F/3 and F/5 are referred to later.

Combustion Chambers	1 annular
Compressor type ...	1 axial
Max Power (S.L. Static)	3,850 lb thrust, 7,750 r.p.m.
Recommended Cruising (S. L. Static)	3,400 lb thrust, 7,400 r.p.m.
Weight	1,550 lb



BERYL

GHOST

De Havilland Ghost

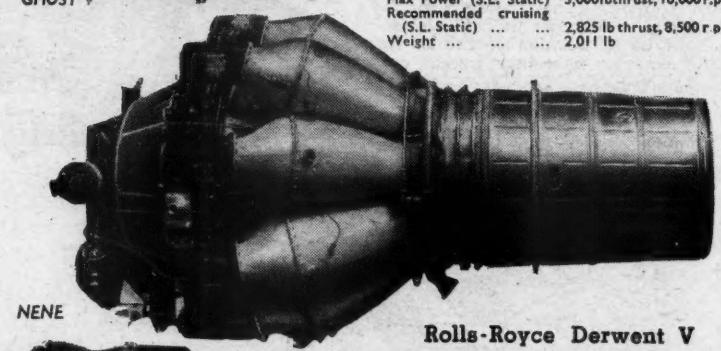
DEVELOPMENT of the largest de Havilland turbo jet, the Ghost, has been proceeding for some months and units on test have given better than their designed maximum rating of 5,000 lb thrust. Ghosts are at present undergoing flight development for the D.H.106 high-speed civil transport in a slightly modified Vampire and in a Lancastrian flying test-bed. These engines are provisionally rated at 4,500 lb thrust and special attention is being paid to reliability and economy.

Combustion Chambers...	10
Compressor type ...	1 centrifugal
Max Power (S.L. Static)	5,000lbthrust, 10,000 r.p.m.
Recommended cruising (S.L. Static)	2,825 lb thrust, 8,500 r.p.m.
Weight	2,011 lb

Rolls-Royce Nene I and II

IN many of its characteristics the Nene is virtually a scaled-up version of the Derwent V, and in basic layout—single centifugal compressor with double-sided impellor and single-stage turbine—it is also the same. This powerful pure jet unit, which is supplied with high or lower rating according to requirements, has been or is to be installed in a number of military and civil prototypes, for example, the Attacker, A.W.52 and Tudor VIII. A large number of people have enjoyed the experience of flying on Nene power alone in the Lancastrian flying test-bed.

Combustion Chambers...	9
Compressor type ...	1 centrifugal
Max Power (S.L. Static)	4,500lbthrust, 12,000r.p.m.
(Nene II)	5,000lbthrust, 12,300r.p.m.
Recommended Cruising (S.L. Static)	3,500lbthrust, 11,200r.p.m.
(Nene II)	4,000lbthrust, 11,600r.p.m.
Weight	1,640 lb

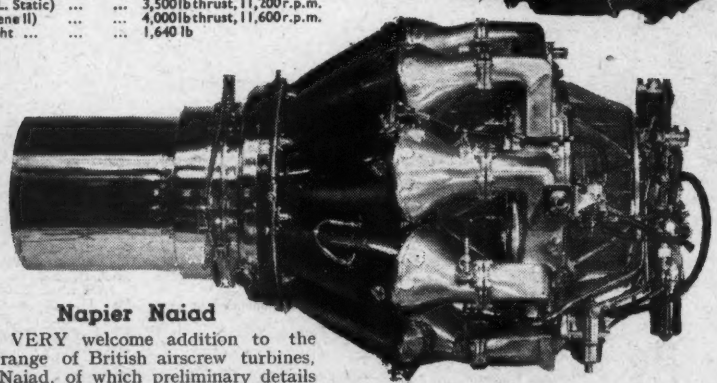


NENE

Rolls-Royce Derwent V

IF an attempt were made to name the all-round best aircraft gas turbine in the world the Derwent V would probably be the first choice. This compact and powerful unit is perhaps best known as the power plant of the Gloster Meteor twin-engined fighter which until recently held the world's air speed record and was the first aircraft to exceed 1,000 k.p.h. A long period of development and considerable operational experience has led to outstanding reliability and, for gas turbines, a very long inter-overhaul period.

Combustion Chambers...	9
Compressor type ...	1 centrifugal
Max Power (S.L. Static)	3,600lbthrust, 14,700r.p.m
Recommended Cruising (S.L. Static)	2,675lbthrust, 13,600r.p.m
Weight	1,280 lb

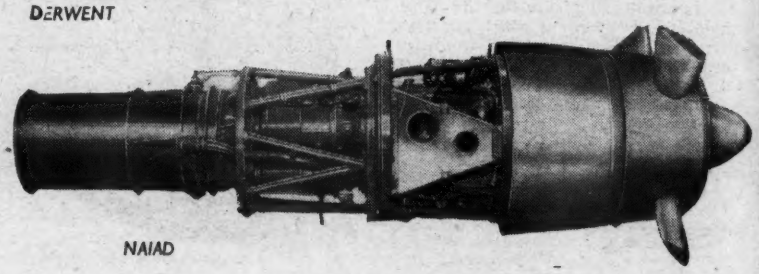


DERWENT

Napier Naiad

A VERY welcome addition to the range of British airscrew turbines, the Naiad, of which preliminary details have recently been announced, is a compact 1,600 h.p. unit with axial-flow compressor and air intake through the annular opening in its hollow spinner. A feature is the high engine speed permitted—18,250 r.p.m. Several civil and military installations are in mind for Naiads.

Combustion Chambers...	5
Compressor type ...	1 annular
Max Power (S.L. Static)	241 lb thrust, 1,500 s.h.p., 18,250 r.p.m.
Recommended Cruising (S.L. Static)	268 lb thrust, 902 s.h.p., 17,000 r.p.m.
Weight	1,095 lb

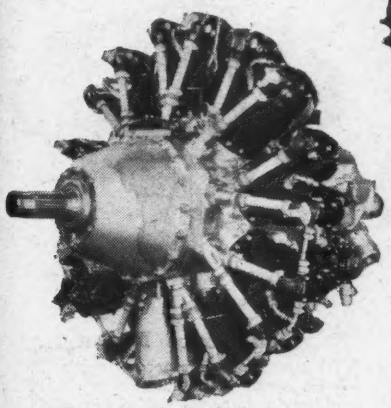


NAIAD

Alvis Leonides

IN a class of its own among British engines, this compact unit has received well-deserved support from a number of aircraft manufacturers. The prototype Concordia has two Leonides and these engines are expected to be fitted in Percival Princes, Short Sealands and Fairey and Westland helicopters. According to reduction gear ratio and accessory arrangements Leonides models are known as Type 501/1, 2, 3 or 4, and the weights vary by 20 lb. Low pressure fuel injection is a feature, and all engines are fitted with fully feathering and braking airscrews.

Cylinders	Nine radial
Recommended cruising	340 b.h.p., 2,600 r.p.m. at 11,000ft
Take-off	505 b.h.p.
Weight	760/780 lb



LEONIDES

Armstrong Siddeley Cheetah 15 and 25

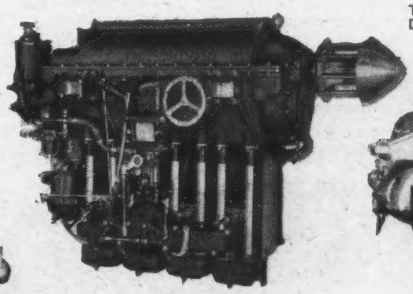
THE first engine in the Cheetah line, introduced no less than 17 years ago, was originally called the Lynx Major. Since that time various marks of Cheetah have seen continuous service all over the world and are still giving excellent service in Oxfords, Consols and Anson variants. The latest Mk. 25 is similar to the 15 but has a specially high take-off rating and may be supplied with a large diameter (9ft 4in) Rotol airscrew.

Cylinders	Seven radial
Recommended cruising	260 b.h.p., 2,100 r.p.m. at S.L.
Take-off power	420 b.h.p., 475 b.h.p.
Dry weight ...	805 lb

Blackburn Cirrus Minor II

THE latest Minor II is the well-known power unit of such club machines as the Auster and Gemini. These and other Cirrus-engined machines have proved a very popular export line, and the Blackburn Company are at present building up an excellent overseas servicing and spares organization. By comparison with the earlier 90 h.p. Minor I the Cirrus II engine has a higher compression ratio (6.25:1) and slightly larger bore.

Cylinders	Four in line
Recommended cruising	80 b.h.p., 2,200 r.p.m. at S.L.
Take-off power	100 b.h.p.
Dry weight	234 lb



CIRRUS MINOR

Bristol Hercules

PROBABLY the all-round best two-row radial ever produced, the 14-cylinder sleeve valve Hercules has appeared in many marks to suit a variety of operational requirements, and in all nearly 60,000 have been built. Last year, following a strengthening up of the crankcase and main bearings and modification of the cylinder and heads, the take-off output was raised to 2,000 h.p. for Series 230 and 730 power plants. Single-stage 730s now follow earlier 630s. Torquemeters are fitted to engines with odd series numbers. An experimental high power two-stage civil unit, the 763 is a development of the military 261. Four Hercules 637s are installed in Short Solents. Like other units in this series they have Hobson-R.A.E. master-control bulk-fuel injectors.

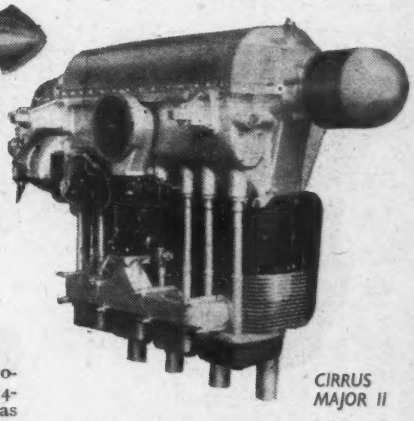
Hercules 630

Cylinders	Fourteen radial
Recommended cruising	1,330 b.h.p., 2,400 r.p.m. at 9,250ft
Take-off	1,690 b.h.p.
Weight	1,905 lb

Blackburn Cirrus Major II & III

SINCE the first engine was produced in 1925, Cirrus four in-line units have been fitted in a great many successful light aircraft. At present Majors are doing excellent work, particularly in the Miles Aerovan where their sturdy reliability is appreciated by operators. The Cirrus Major III has a slightly higher compression ratio than the II (6.5:1 compared with 5.8) and therefore requires higher grade fuel. In return it gives an extra 7 h.p. for take-off and 5 h.p. at full throttle, in flight.

Cylinders	Four in line
Recommended cruising	125 b.h.p., 2,100 r.p.m. at S.L.
Take-off power	145 b.h.p.
Dry weight	333 lb



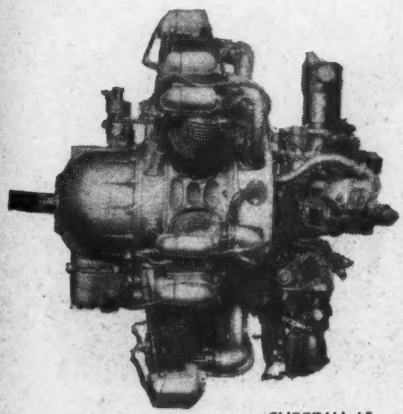
CIRRUS MAJOR II

Bristol Centaurus

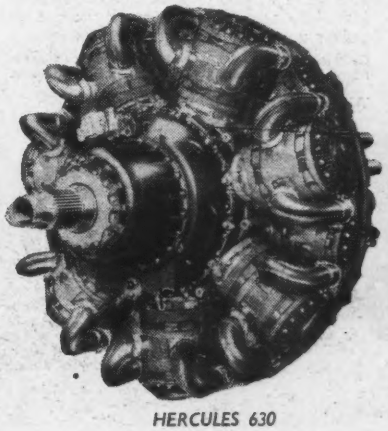
MOST powerful British radial, the sleeve-valved 18-cylinder Centaurus, provides the power for many military and civil aircraft: for example, the Ambassador has two Centaurus 130/630s, single-stage units with flexible mountings and structural modifications similar to those mentioned for stiffened-up Hercules engines. The units are civil versions of the XVIII as fitted to the Sea Fury which has interconnected throttle and airscrew controls. Coupled pairs of Centaurus units fitted to the Brabazon I are basically 57s, known in modified form as 20s.

Centaurus 130/630 series

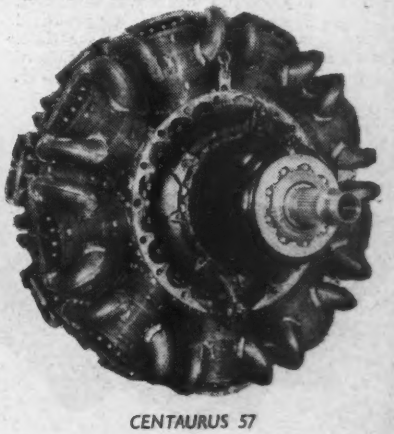
Cylinders	18 radial.
Recommended cruising	1,805 b.h.p., 2,400 r.p.m. at 9,500ft
Take-off	2,600 b.h.p.
Weight	2,980 lb



CHEETAH 15



HERCULES 630



CENTAURUS 57

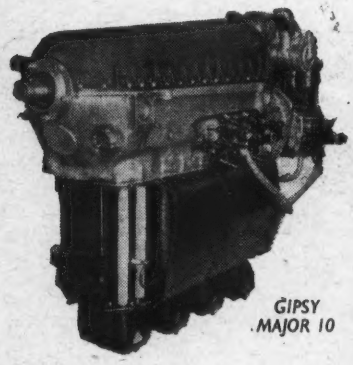
British Power Units . . . . .

De Havilland Gipsy Major

NO light aircraft engine can better the world-wide reputation of the Gipsy Major which is noted in particular for its reliability, economy and exceptionally long inter-overhaul period. The latest production version, developed from the Mk. I, is the Major 10, while a new higher powered series, examples of which are the Major 30 and supercharged Major 50, have reached an advanced stage.

Gipsy Major 10

Cylinders	Four in line
Recommended cruising	115 b.h.p., 2,300 r.p.m. at 5,000ft
Take-off	145 b.h.p.
Weight	312 lb



GIPSY MAJOR 10

Jameson

AN interesting newcomer to the range of light aircraft engines, the flat four Jameson, has several novel design features. One of its particular claims to fame is the exceptionally low fuel consumptions achieved. On official tests at full throttle a consumption figure of 0.44 pt/b.h.p./hr has been recorded.

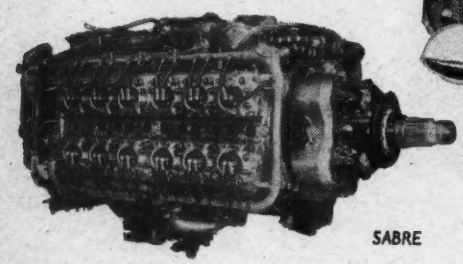
Cylinders	Four horizontally opposed
Recommended cruising	90 b.h.p., 3,000 r.p.m.
Take-off power	110 b.h.p.
Weight	280 lb

Napier Sabre VA

THE twenty-four cylinder sleeve-valved flat H Sabre series were at the end of the war the most powerful piston engines available for our fighters and they had built up an excellent reputation as the power unit of Typhoons in particular. When water/methanol injection was adopted and the VA became the Mk. VII, the 3,000 h.p. figure was surpassed. A few Sabre VAs are still being produced for Tempest VIs in service in the East. A two-seat target towing adaptation of the Tempest V is to have Sabre IICs.

Sabre VA

Cylinders	24 H horizontal
Recommended cruising	890 b.h.p., 2,500 r.p.m. at 11,500 ft
Take-off power	2,310 b.h.p.
Weight	2,490 lb



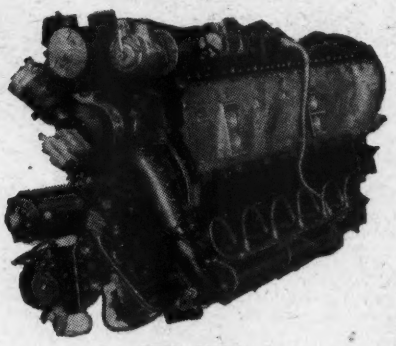
SABRE

De Havilland Gipsy Queen

OF the latest D.H. six-in-line engines the 30 series are normally aspirated and the 50s and 70s supercharged. The excellent record of the Rapide or Dominie design powered with two Gipsy Sixes is in itself a testimonial to these units. Series 50s are scheduled for the Merganser, and the geared higher-powered 70 Series are now doing very good work in the Doves and Marathons. Private owners, Service and Club pilots will be familiar with Gipsy Six performance in Proctors, while the Queen 30, the direct development, is making its Service debut in the Prentice. The addition of one to any of the numbers e.g., Queen 71, indicates an engine built to M.o.S. order. Series 30 and 70 engines are at present in production.

Gipsy Queen 70

Cylinders	Six in line
Recommended cruising	265 b.h.p., 2,400 r.p.m. at 7,750ft
Take-off	345 b.h.p.
Weight ...	510 lb

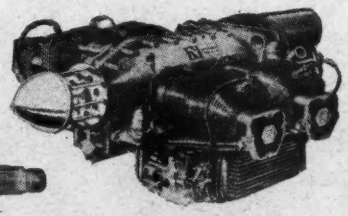


GIPSY QUEEN

Nuffield

WHEN it was announced that the Nuffield organization was to enter the light aero engine market with a 100 h.p. flat horizontally-opposed four design it was hoped that a company with such an enormous productive capacity and experience of large-scale manufacture might be able to produce for the first time a British light engine at a price comparable with American counterparts. Whether or not a cost figure of 25s to 30s per horse power will ultimately be achieved remains to be seen, but development of the Nuffield is proceeding and there will be no shortage of suitable installations when this eagerly awaited power unit becomes available.

Cylinders	Four horizontally opposed
Recommended cruising	70 b.h.p., 2,300 r.p.m. at S.L.
Take-off power	100 b.h.p.

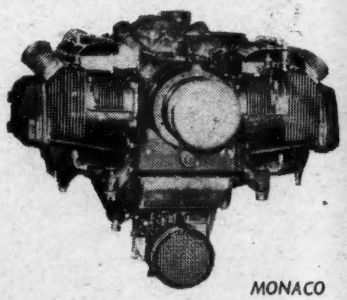


NUFFIELD

Monaco

PLANS for the production of Monaco engines include two flat-fours of 75 and 100 h.p. output respectively. Development of the 100 h.p. version is progressing and several hundred hours running have been completed. Air tests will, it is expected, be made in an Auster. The manufacturers have had considerable experience with high-performance engines and in the design of this first aircraft engine special attention has been paid to the airframe designer's requirements and to accessibility.

Cylinders	Four horizontally opposed
Recommended cruising	85 b.h.p., 2,420 r.p.m. at S.L.
Take-off power	100 b.h.p.
Weight	230 lb



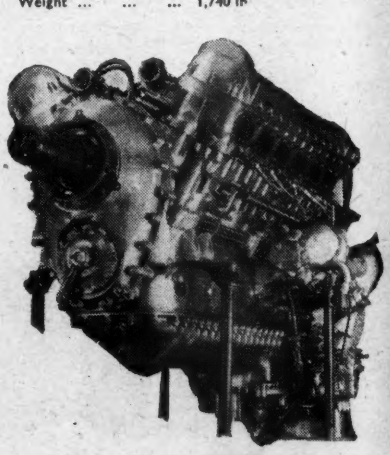
MONACO

Rolls-Royce Merlin

NO introduction is needed to the Merlin series of engine which achieved world-wide fame as the power unit of many of our most successful military aircraft. In the last few months the civil two-speed two-stage power plants built round the latest Merlin 600 and 620 units have entered the North Atlantic service in Canadian D.C.4Ms. Earlier Merlins are used on the South Atlantic routes in Lancastrians and on the Empire routes in Yorks, while recently both types have been used on the Azores Bermuda route on flight refuelling and Tudor IV experimental flights.

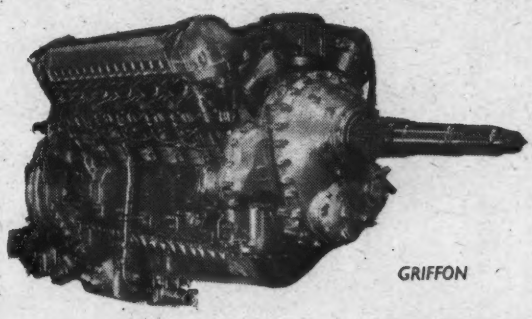
Merlin 600, 620, 621

Cylinders	12 v
Recommended cruising	M.S. 1,780 b.h.p., 3,000 r.p.m. at 4,500ft
	F.S. 1,655 b.h.p., 3,000 r.p.m. at 16,750ft
Take-off	1,725 b.h.p.
Weight	1,740 lb

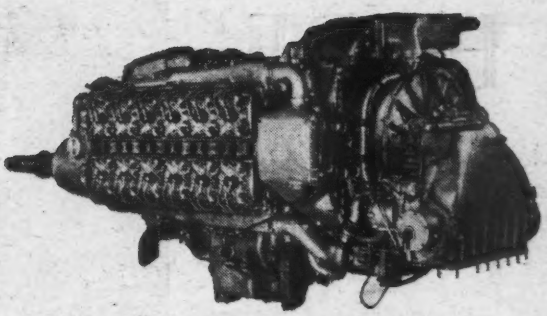


MERLIN

British Power Units . . . . .



GRIFFON



EAGLE

Rolls-Royce Griffon

THE power output of the latest Griffons, which are of only 36.7 litres capacity is exceptional, and with water/methanol injection the Griffon 57, forerunner of a civil Griffon which has reached an advanced stage of development, gives the astonishing figure of 2,450 h.p. for take-off, a power to weight ratio of just over 0.82lb/b.h.p. The three-speed Griffon 121 with contra-rotating airscrew is rated at no less than 31,750ft, at which altitude it still gives 1,165 h.p. for economical cruising.

Griffon 57.

Cylinders	12 v	
Recommended cruising	M.S. 1,390 b.h.p., r.p.m. at 6,500ft	2,400
	F.S. 1,195 b.h.p., r.p.m. at 12,750ft	2,400
Take-off	F.S. 2,450 b.h.p.	
Weight	2,020 lb	

IN addition to the gas turbines and piston engines illustrated on the previous pages there are five other gas turbines of which some information is available. These are the thrust-augmented Metrovick F-3 and F-5 which are basically similar to the F-2/4 illustrated, and three Rolls-Royce airscrew turbines, the Dart, Clyde and experimental Trent. Some details of these engines are given below.

Reference was made last week to certain other gas turbines under development for which power figures and dimensions are still confidential, namely, the Mamba II, Phoebus I, Proteus I, de Havilland H.3 and Power Jets 250.

Rolls-Royce Eagle

LATEST and largest British piston engine, the Eagle, is the first sleeve valve unit to be put into production by the Rolls-Royce Company. At present it is the power unit of the Westland Wyvern Naval strike aircraft, but this duty may later be taken over by an airscrew turbine unit. A new large piston engine of 3,500 h.p. output which may be developed to give well over 4,000 h.p. is a most useful addition to the country's range of power units for military or civil applications.

Cylinders	24H	
Recommended cruising	M.S. 2,320 b.h.p., r.p.m., at 10,250ft	3,100
	F.S. 2,180 b.h.p., r.p.m., at 20,000ft	3,100
Take-off Power ...	... 3,415 b.h.p.	
Dry Weight ...	... 4,220 lb	

Metrovick F/3 and F/5

THE gas producer section of the F/3 and 5 are essentially similar to the F.2/4, but these most interesting units are equipped respectively with ducted fan and open fan thrust augmenters. Such units can be classed mid-way between the pure jet and airscrew turbine types, and fan augmentation can provide many of the advantages and few of the disadvantages of both classes.

Combustion Chambers...	1 annular
Compressor type ...	1 axial
Max Power (Static) (F/3)	4,600 lb thrust, 7,390 r.p.m.
(F/5)	4,710 lb thrust, 7,700 r.p.m.
Economical Cruising (F/3)	3,900 lb thrust, S.L. static
(F/5)	2,300 lb thrust at 20,000ft
Weight	2,200 lb

Rolls-Royce Dart

ANOTHER Rolls-Royce airscrew turbine, details of which are eagerly awaited, is the Dart, which is shortly to commence its air tests. It is a small airscrew turbine in the 1,000/1,500 h.p. class, and many hundreds of hours of development running have been completed on the beds both with and without airscrew. Darts are possible power units for advanced military trainers, and the announcement of a successful type test may be expected shortly. The power figures quoted are provisional.

Compressor type ...	1 axial
Provisional Power (S.L. Static)	1,000 b.h.p., 325 lb thrust= 1,125 equiv. b.h.p.

Rolls-Royce Clyde (and Trent)

DETAILS have not yet been released concerning the Clyde airscrew turbine, which has one axial and one centrifugal compressor. This interesting unit has reached an advanced stage of development and a great deal of additional information, valuable in its design, has been obtained from the Trent research unit, examples of which have many flying hours to their credit. The Clyde has not yet flown nor have any installation proposals been mentioned.

Combustion Chambers	9
Compressor type ...	1 annular, 1 centrifugal
Max Power (S.L. Static)	3,020 s.h.p. 1,225 lb thrust, 6,000 r.p.m.=3,490 equiv. b.h.p.
Weight	2,800 lb

The Hawker N.7/46

ACUTE disappointment will be felt at Radlett this week at the absence, due to official restriction, of the Hawker N.7/46 naval fighter powered by a single Rolls-Royce Nene. Those who have seen this new Hawker jet remark on its businesslike appearance and uncanny silence.

The Stooge at Radlett

FOR the first time a British controlled missile will be displayed at Radlett this year. The Fairey Stooge, complete with launching ramp, is to be exhibited on the airfield and close examination will be possible.

The Stooge achieves a maximum speed far in excess of 500 m.p.h. when using four rockets of 75 lb thrust. It was developed as a counter-measure to Japanese suicide bombers and has been developed to the stage where an operator on the ground can exercise full flight control and pass the missile through a predetermined programme of manœuvres.

Of orthodox monoplane design, the Stooge is 7ft 5½in long and has a span of 6ft 10in. To assist take-off four standard 3-inch A.A. rockets are employed.

New Esso Organization

AN important change, resulting in the world-wide marketing of Esso Aviation Products, will now enable aircraft on long international journeys to be supplied with products of the same name and quality wherever they may need them.

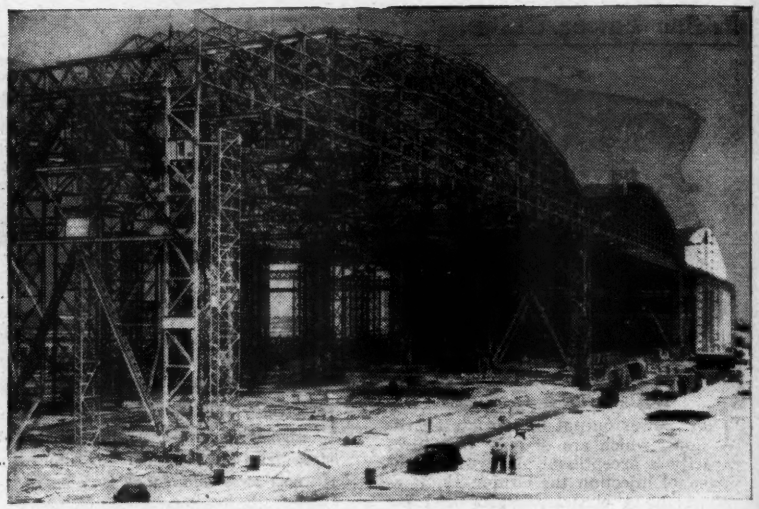
This arrangement, operative as from July 1st, 1947, follows a statement issued in March to the effect that the Intava organization was to be dissolved, and that the termination would extend over a two-year period in order not to affect existing contracts and services.

The new Esso organization commenced operating in the United Kingdom on August 1st, 1947, and is continuing to fulfil contracts formerly supplied by Intava.

Following the dissolution of the Petroleum Board on December 31st, 1947, a full range of aviation products, including fuels, lubricants, de-icing fluids and rust-preventives will be marketed under individual brand names.

Headquarters of the Esso Aviation Department will be at Artillery House, Artillery Row, London, S.W.1, with Mr. R. B. Benwell as manager and Mr. D. Airey as sales manager.

HERE AND THERE



BRABAZON'S HOME: The immense size of the partially completed Brabazon hangar at Bristol dwarfs the car and workers pictured beside it. Concrete flooring will cover eight acres and a further 6½ acres of concrete apron will be laid in front of it.

De Havilland Scholarships

THE de Havilland Educational Council has decided to grant ten scholarships yearly to outside applicants entitling them to the full engineering apprenticeship training without payment of fees. The new scholarships are open to well-educated British boys, and a certain number will be available to applicants from the British colonies and Dominions. The training offered occupies about four years from the age of seventeen, so candidates, who must be sponsored by their school authorities, should apply before their seventeenth birthday. The de Havilland Aeronautical Training School, Hatfield, Herts, to which application should be made, has turned out 1,450 trained technicians since its inauguration in 1928.

Marine Gas Turbine

IN the issue of *Flight* of August 28th, we commented in these columns on development work with gas-turbine engines undertaken by the Admiralty. Further details now released reveal that the first watercraft to be powered by a gas turbine has been taken to sea by the Royal Navy, and preliminary tests are proceeding satisfactorily. The gas turbine now under trial has been developed by the Metropolitan Vickers Electrical Company, Ltd., and has been installed in H.M. motor gun boat 2009. It drives the central shaft of the craft and takes the place of one of the three 1,250 b.h.p. petrol engines which formerly powered her. The M.G.B. 2009 installation is essentially an experimental one.

Height of Success

ACHIEVEMENTS of British gliding experts in America are being closely followed by the gliding fraternity in this country. News of the latest success came last week from California, where Mrs. Naomi Allen beat an International record for women glider pilots when she soared 10,400ft above the point of release to a maximum height of 14,400ft. Her flight, which beat the previous American record of 7,200ft, made last July by Miss Jennie Bennis, was officially recorded by the Soaring Society of America.

Reading Garden Party

KEN WALLER, Miles test pilot, demonstrated the M.68 for the first time to the public at a garden party organized by the Reading branch of the Royal Aeronautical Society held on Saturday, September 6th, at Woodley airfield, Reading. American delegates to the Anglo-American Conference were guests of the Royal Aeronautical Society at this event.

ROYAL INTEREST: Major General Prince Firuz, Inspector General of the Imperial Iranian Air Force, with Mr. F. H. M. Lloyd (Sales manager) watching a demonstration of a Hawker Sea Fury piloted by Mr. Humble, Hawker's chief test pilot.

Holiday Airfield

MEMBERS of the flying fraternity are to be the guests of Mr. W. E. Butlin at his holiday camp at Pwllheli, North Wales, from September 20th-22nd, when he officially opens Broom Hall airfield, a flying base adjacent to his camp. Invitations have already been sent out to flying clubs and owners of private aircraft, and a large gathering is expected to attend the party. Broom Hall airfield is not yet marked on any map, but its position is given as 52° 55′ N., 4° 22′ W.

News in Brief

Because of the shortage of shipping accommodation, India's cricket team, which is to tour Australia later in the year, is to travel from India to Australia by air.

* * *

The first three members of the W.J.A.C. to receive training in glider flying have gained their "A" gliding certificates after a week's course at the London Gliding Club. They are adjutant Joan Donovan, sergeant Joyce King and lance-corporal Phyllis Weir.

* * *

American sources have reported that for the first time a V2 rocket is to be fired somewhere in the Atlantic from a warship, the 45,000-ton U.S. aircraft carrier *Midway*.

* * *

Twelve pilots in B.O.A.C., all of whom have flown over a million miles, have been promoted to Senior Captain first class. The Corporation now have a total of nineteen personnel with that rank—the most senior in the Corporation's aircrew.

* * *

Moscow radio has reported that Elena Vladimirskaya, Soviet woman parachutist, has made a delayed drop from a height of 18,000ft. The descent was made without oxygen apparatus.

* * *

In an article on the M.68 which appeared in last week's issue of *Flight* we inadvertently referred to the Merchantman as being equipped with four Cirrus Major engines. This should, of course, have been four Gipsy Queen 30s.

The Anglo-American Conference

Icing of Gas Turbines : Large and Small Aircraft

THE Aeronautical Conference convened jointly by the Royal Aeronautical Society and the American Institute of the Aeronautical Sciences was officially opened by Sir Frederick Handley Page on September 3rd. He recalled that the suggestion to hold such meetings came from the Secretary of the R.Ae.S., Capt. J. Laurence Pritchard, many years ago, but that not until now had it been possible to realize that ambition. The link between the two societies was a long one, with some 36 Wilbur Wright Memorial Lectures already delivered in this country, while in America the number of Wright Brothers Lectures had reached a dozen or so.

Sir Frederick welcomed the American lecturers not only as technicians but as very good friends ; in particular he welcomed Mr. P. R. Bassett, president of the I.A.S., and Mr. S. Paul Johnston, vice-president.

Mr. Bassett, replying on behalf of the American visitors, referred to the excellent organization of the meeting, which was such as to make it easy for the visitors to find their way about. The I.A.S., as the junior partner, had long aspired to a joint conference, and now it had been realized. The Americans had not come here to say that all the British lecturers said was right. They had come to argue, and there was no one solution to any problem ; they hoped to find several.

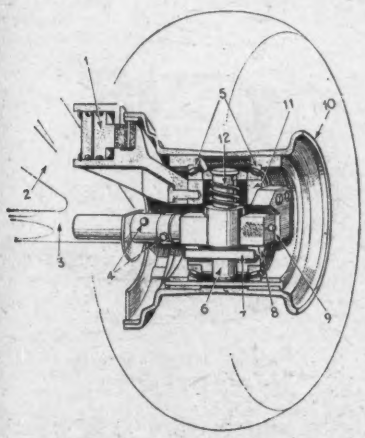
Co-operation between American and Britain during the war had shown, in connection with American day bombing and British night bombing, that neither side was necessarily right, but that the combination was better than either singly. He hoped the same would be the case with the conference.

Personal Aircraft

By T. P. Wright

CIVIL Aeronautics Administrator is the official title of Mr. T. P. Wright, whose subject, "Personal Aircraft," was thus very well chosen since he is in a better position than most to evaluate the market, present and potential, for what we should call private-owner types.

Mr. Wright began by explaining the reasons for attaching great importance to this field. A relatively small number of transports could carry the long and short-haul air traffic in the U.S.A. ; further uses were of a commercial nature, and yet another was the executive transport. Military aircraft would probably continue to be an important part of the aircraft industry, but the personal aircraft was the only class for which an almost unlimited market was available, provided certain conditions were fulfilled. At present the personal aircraft types were not considered to have sufficient overall merit.



Sectioned view of C.A.A. Goodyear Cross-wind Landing Gear. 1, single-disc brake ; 2, vee strut ; 3, axle ; 4, attaching bolts, will fit any standard axle ; 5, roller bearings ; 6, king pin ; 7, compensating cam ; 8, compensating-cam follower ; 9, shimmy-damper brake ; 10, wheel ; 11, castering hub ; 12, return spring.

The economics of private ownership were surveyed next under the headings: demand, supply, and utility. Mr. Wright thought the wish to fly did exist, but that to increase the numbers who would satisfy that desire the utility of the aircraft must be increased. Due to the fact that maximum interest in piloting was in the 25 age group while the maximum wage earnings were in the 45 group, there was a disparity of 20 years which must be given full consideration. He expressed the view that the ability to pay would only be satisfied with a considerable reduction in present prices, and thought the price of a four-seater would have to come down to a figure between 4,400 dollars and 5,400 dollars, compared with the present 7,900 dollars.

Two methods could lead to a reduction of manufacturing costs: designing for low production costs, and increase in production quantities. Much progress had already been made in the former, and Mr. Wright foresaw the possibility of a reduction of some 12 per cent. It was assumed that the output of personal aircraft would increase five-fold between now and 1955, and in that case it should be possible to achieve a cost reduction, due to quantity manufacture, of about 30 per cent. Thus eight years hence the final price should be about 62 per cent of the present, and with a great deal of utility added.

Mr. Wright foresaw reductions in operating costs under four heads:

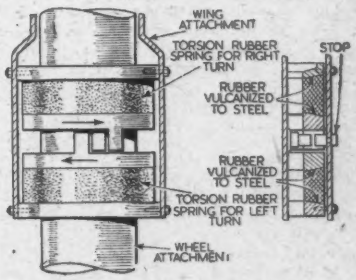
1. Depreciation, forming some 26 per cent of the total, would drop by virtue of reduction in initial sales price and improved design, making for longer life.

2. Insurance costs, of about the same magnitude, would also drop due to the lower first cost, improved safety records and other factors.

3. Hangar rent, some 13 per cent of the total, would be lowered by innovations such as folding or removable wings.

4. Maintenance and repairs, about 15 per cent, would be reduced by design improvements.

As for the type of aircraft that was wanted, Mr. Wright emphasized the belief that the four-seater was the type on which effort should be concentrated. There was a trend away from the two-seater type and towards the four-seater.



Firestone "Superflex" cross-wind undercarriage torsional restraint.

Perhaps the most interesting part of Mr. Wright's paper was that which dealt with methods of increasing the utility of private-owner aircraft. He thought a cruising speed of 150 m.p.h. necessary and sufficient, any speed above that being sacrificed to other features such as decreased take-off distance, increased rate of climb, and lower landing speeds.

Considerable space was devoted to the subject of cross-wind landing gear. Some weeks ago Mr. Wright contributed a letter to our Correspondence pages, outlining the great interest taken in this in America, and giving full credit to the British originator, Mr. Maclaren. In the paper he explained that, after discussions in England with Mr. Maclaren, C.A.A. decided to embark on a programme of development which, it was hoped, would prove to the industry the importance of universal adoption of a landing gear that would permit safe cross-wind landings under any conditions. It was decided that the burden of another control should not be added to complicate the already arduous task of the pilot*, and development was therefore based on a castering gear with suitable centring and anti-shimmy devices.

The programme included the development of six models, diversified as to size of aircraft, shock-absorber design and undercarriage arrangement (conventional and tricycle) In the case of the Fair-

*The original Maclaren scheme was for a pre-set undercarriage angle, adjusted to the existing drift. —Ed.

The Anglo-American Conference . . . . .

child, king pins are mounted ahead of the shock struts, and cams are used to overcome static instability of the positive caster angle. Springs are provided to load the cams in the air, and shimmy is controlled by hydraulic dampers. In the Piper Cub, modified by Goodyear, the cams are similar, and shimmy is controlled by a friction damper. The entire mechanism is mounted within the hub.

"These two ships," Mr. Wright said, "have been flown by more than 100 pilots with the most surprising uniformity of approval that it has been my experience yet to witness for new developments of this kind. The Fairchild has been operated in cross-winds up to 50 m.p.h. and the Cub across winds up to 35 m.p.h."

The Firestone version, mounted on an Ercoupe, uses rubber in shear as the return device, and takes care of shimmying by a friction mechanism. Mr. Wright explained that in installations now being developed for the Bellanca and the Beech, the wheel will swivel in its oleo strut. On the Bellanca twin wheels take care of shimmy, and on the Beech there will be a shimmy-damper of a wheel side-motioning type, or possibly hydraulic. The final development will be for a DC-3 and is being worked out by Goodyear. It will be analogous to that used on the Cub.

Mr. Wright concluded this section of his paper with the words: "Because of the extremely favourable results achieved so far, I have no hesitation in predicting the universal adoption of the castering cross-wind landing gear for personal aircraft, with very substantial uses on many, if not all, other types as well."

After examining accident causes and suggesting remedies, Mr. Wright summarized the characteristics of the personal aircraft as follows:

Size and General Arrangement: Four-seater with adequate space for luggage; gross weight 2,500 to 3,000 lb (empty weight 1,550 to 1,800 lb, and airframe weight 1,000 to 1,200 lb); low-wing arrangement, possibly pusher; unrestricted pilot view at all times; horsepower about 200; tricycle landing gear.

Performance: 150 m.p.h. cruising speed; 40 m.p.h. landing speed (45 m.p.h. stalling speed); 500 ft/min minimum sea level rate of climb.

Safety Features: Non-vicious spinning characteristics (not spinnable, or rapid recovery); two-control (optional); stall-warning device; flight-operating characteristics indicator; simplification of engine and airscrew controls.

Special Equipment: Low external noise level (also internal, for passenger comfort); radio receiver and transmitter; range receiving equipment; consideration of use of gas turbine-airscrew combinations; castering wheels for cross-wind landings.

Structural Problems of Large Aircraft

By Henry Knowler, A.M.I.C.E., F.R.Ae.S.

LARGE aircraft, Mr. Knowler pointed out, is a relative term. As a designer (he is director and chief designer of Saunders-Roe, Ltd.) he could look back over many years filled with problems. Each aircraft being designed was bigger than its forerunner. One might say, therefore, that the new problems were the old ones grown up. The subject really reduced to the one common problem of preventing the structure weight percentage from increasing with size. [We used to call it "cheating the square-cube law."—ED.] The "dynamic gust case" was the only problem associated with large aircraft as such.

The large aircraft, *per se*, was dictated essentially by the demands of long-range, commercial payload transport, where the influence of structure weight and fuel weight had equal significance. So far as fuel economy was concerned, coupled with high cruising speed at height, the airscrew gas turbine was the obvious choice, with its low installed weight and a specific consumption which improved with height and was equal to if not better than that of the highly supercharged piston engine.

It was found, from an examination of the parameters concerned, that the economics to be obtained by manipulating the external geometry of the wing were limited. Consequently one had to turn to the full exploitation of the characteristics of the structural material, and to the internal layout, if a reasonable wing weight were to be obtained. Raising the specific developed strength of the material was the most fruitful means of achieving an economical structure. Materials in tension could be made to develop their full ultimate strength, but in compression the strength was limited by the stability of the structure. The use of lighter materials, such as magnesium alloys, appeared to offer considerable advantages in the greater stability of the local structure. Unfortunately, its lower corrosion resistance precluded its use in flying-boats.

Of wing-structure forms Mr. Knowler said that the box beam was lighter than the two-spar construction, and that the stressed-skin wing was fundamentally lighter than the single- or two-spar construction for aircraft of reasonable size. Investigations had shown that the ideal wing (a homogeneous structure without joints, cutaways and secondary structure) might be only one-half of an actual weighed wing.

In the cases of fuselages and boat hulls, the indications were that there might be a saving in weight with size. Pressurization might increase fuselage weight by 1 per cent, but in the case of the SR.45 flying-boat hull the weight increase was only ½ per cent, due to the fact that structure provided for other reasons was utilized.

Mr. Knowler had a good deal to say about strength requirements. In large-span aircraft the dynamic effect of gust loads was to increase greatly the stresses compared with those for a rigid wing. Aerodynamic damping provided a powerful alleviation, but with existing knowledge of the gust structure the wing bending moments were considerably greater than those for a rigid wing. On the SR.45 the weight of wing bending material was increased by 10 to 20 per cent. He paid a tribute to Mr. A. E. Russell, of the Bristol Aeroplane Co., Ltd., for his scheme of anticipating the action of the gust by increasing or decreasing lift of the outer wing sections by the rapid use of the ailerons as flaps.

Turbine Icing Problems

By A. G. Elliott, C.B.E., M.S.A.E., F.R.Ae.S.

COMPARATIVELY little information has been published on the subject of icing problems in turbine engines. Those closely connected with the development of this type of power plant are, of course, well aware of them, but hitherto the student outside the gas turbine field has not had access to such information. It was, therefore, very timely that Mr. A. G. Elliott, who is director and chief engineer of Rolls-Royce, Ltd., should choose this subject for his paper. He revealed that his firm has done a great deal of research and development work, some results of which were incorporated in the paper.

Mr. Elliott began by defining the requirements of de-icing and anti-icing in turbines. He considered anti-icing (prevention of ice formation) the only finally satisfactory solution. An outline was then given of the piston-engine background of icing, followed by a brief review of the weather conditions to be covered.

The engine problem was approached by grouping turbine engines under three broad categories: plain jet, turbines driving airscrews, and ducted-fan types.

Plain jets could again be subdivided into those using axial and those using centrifugal compressors. In piston engines no icing of centrifugal compressors has been experienced, but in the turbine type the problem was intensified by the enormously increased flow of air. A Derwent V used 60 lb of air per second, or approximately 100 tons of air per hour, compared with the 3 to 4 lb per second of a Merlin. Nevertheless, the centrifugal compressor was very free from icing because of its self-warming properties. The axial-flow type, on the other hand, was most susceptible, and a small accumulation of ice could have a

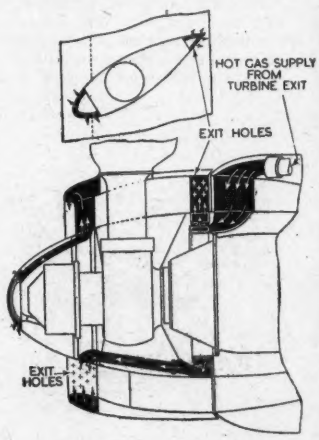


Fig. 1. Hot-gas anti-icing of intake spinner on a single airscrew.

serious effect on efficiency, apart from the vibration that would develop. For the axial-flow compressor, therefore, complete prevention of ice formation was imperative.

In general there were two methods of anti-icing jet engines: by heating the total volume of air, and by raising the temperature of the affected surfaces only. The air might have to be raised in tem-

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perature by at least 25 deg C, and in addition there was loss of thrust due to the drag of the tube grill. Alternatively a hollow-bladed windmill in the air intake, fed with hot gas, was likely to give the required mixing with much less drag.

For surface-heating, electrical and hot-gas means had to be considered. For

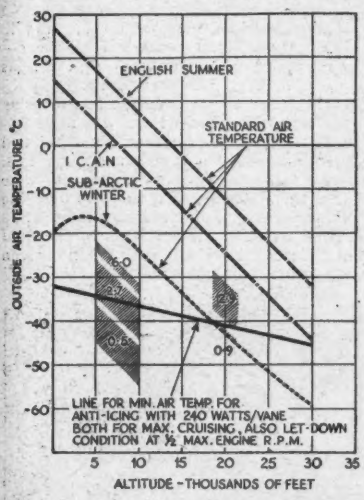
ENGLISH SUMMER
STANDARD AIR TEMPERATURE
I.C.A.N. SUB-ARCTIC WINTER
6·0
0·5
0·9
LINE FOR MIN. AIR TEMP. FOR ANTI-ICING WITH 240 WATTS/VANE BOTH FOR MAX. CRUISING, ALSO LET-DOWN CONDITION AT ½ MAX. ENGINE R.P.M.
OUTSIDE AIR TEMPERATURE °C
ALTITUDE - THOUSANDS OF FEET

Fig. 2. Electrical anti-icing of inlet vanes and first two stages of axial compressor. Minimum air temperature at which anti-icing can be achieved with an input of 240 watts per vane by eddy currents. Vane temperature +1 deg. C, convection and evaporation losses included. The shaded portions with figures indicate percentage of flight at range of temperatures on North Atlantic crossing, compiled from flight returns.

the centrifugal compressor the surfaces that needed heating were the intake nose and intake walls, and possibly the stone guard and inlet vanes. The axial compressor would require heat at the nose, cowling, stone guard, and most probably the first two stages of the compressor, both static and rotating blades. The use of hot air was, therefore, confined to the nose cowling on both types. Both electrical and hot-gas methods were likely to be used for surface-heating light sections. A scheme of eddy-current heating was being tried out at present.

With double-sided impellers there was an appreciable rise of temperature in the plenum chamber. With the single-sided the temperature rise was much smaller. For anti-icing both types, the intake nose and surfaces should be heated, but what further measures were required depended upon the need or otherwise for a stone guard.

The electrical means of surface-heating was to be preferred for the axial compressor if the system could be developed to provide the power requirement, the surface-heating of the intake walls and struts being provided by circulation of hot gas from the engine.

Much the same considerations applied in the case of turbines driving airscrews. There were two types of direct air intake: behind the airscrew, and the type in which the intake was formed in a hollow rotating spinner so that the nose was forward of the airscrew. The latter was more complicated and more difficult to anti-ice, but was more efficient as an air intake. Fig. 1 shows a scheme for an intake spinner on a single airscrew. The root fairings are used for conveying the hot gases across the intake. They have themselves to be heated, and are also used on the trailing edge for discharging hot gas into the air stream. Contra-rotating airscrews introduced further complications.

In the case of ducted-fan engines, the problems were similar to those of axial-flow compressors, but on a larger scale. The increased mass flow militated against heating the whole of the intake air, and surface-heating became necessary for the first rows of blading, the nose cowling and intake walls being heated by gas from the jet pipe.

Mr. Elliott next dealt with engine requirements (bleed proportions, and temperatures and pressures available) and then turned to the question of surface-heating requirements. These were substantially lower than those necessary for raising the temperatures of the whole of the intake air. Taking a multi-stage axial blower of 100 lb/sec mass flow, he estimated that a heat input of 240 watts per blade would be required. This re-

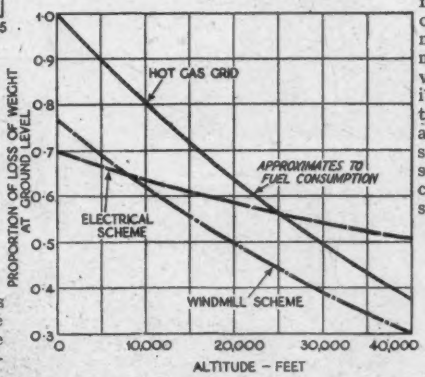

Fig. 3. Comparison of electrical (eddy current) and hot-gas methods for a fixed anti-icing performance. Cruise at 400 m.p.h. approx. for 10 hours with 1.5 per cent of flight in icing conditions.

presented a total of 67 kilowatts. The weight increase would be approximately 100 lb.

Anti-icing by momentum separation was briefly examined, and the lecturer pointed out the drawbacks due to gapped ice guards, coming to the conclusion that this system would only show to advantage on centrifugal compressors, and could be used on axial compressors only in combination with some form of heating. Mr. Elliott recalled that a Derwent V had ice cubes of 1in sides fed into the intake without damage, and that a multi-stage axial compressor had been completely stripped of its blades on a winterization test, due to ice breaking off from the intake and passing through the compressor.

In view of the fact that the turbine engine is regarded as a source of heat for aircraft anti-icing, Mr. Elliott considered the provision of heat as part of engine design. He took the requirements as 1,500 B.T.U.s per hour per square foot

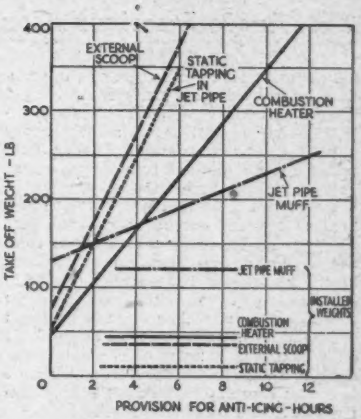

Fig. 4. Derwent V engines. Comparison of wing anti-icing heat supply methods on take-off weight. The weights are per engine. The combustion heater does not include fuel lines or tanks where separate. Weights for bleed scheme and muff include percentage of engine weight attributable for loss of thrust.

of heated wing surface as an average figure. Two methods of supplying heat from the engine were available: Bleed of exhaust gas from the jet pipe, and mixing with cold air to meet the maximum structure temperature permitted, viz., 190 degrees C; and a jet-pipe muff, i.e., a heat exchanger, to take heat from the jet pipe. Of the two, the weight accountable to fuel consumption plus installation weight was greater in the bleed scheme after about two hours in icing conditions. An advantage of the bleed scheme was that full ram pressure could

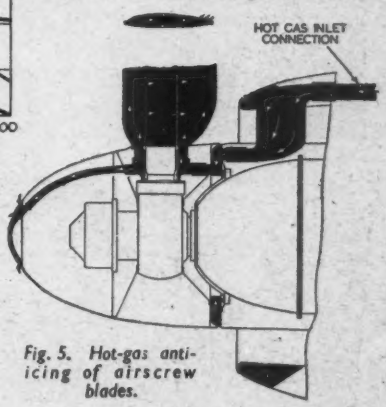

Fig. 5. Hot-gas anti-icing of airscrew blades.

be made available to the wing, apart from cold-air intake losses. Both schemes introduced the problem of anti-icing the cold-air intake. This could best be done by either electrical heating or a small circulation of hot gas from the jet pipe.

When considering methods of obtaining exhaust-gas bleed for wing anti-icing, three possibilities existed: static tapping inside the jet pipe; scoop to obtain dynamic head inside jet pipe; and scoop to obtain dynamic head at the jet efflux.

Mr. Elliott considered that in the airscrew turbine engine the airscrew is much more intimately associated with the engine than it is in the piston-type of engine. He therefore devoted a part of

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his paper to an examination of the problems associated with airscrew anti-icing. Three methods were available for combating ice formation: the fluid, the electrical, and gas heating. The fluid was the only method fully approved at present, but it had drawbacks.

The electrical method employed a heating element extending on each face for 35 per cent of the blade chord from the leading edge. The first 10 per cent of the chord was heated at the rate of 4 watts/sq. in and the remainder at 2 watts/sq. in. The heating element consisted of a base of insulating rubber on which was a layer of electrical conducting rubber, embedded in which were two wire conductors. Power supply was from the airscrew hub generator.

A four-bladed airscrew of 14ft diameter required about 5 kilowatts for heating purposes. It was expected that complete anti-icing would be achieved with the blade surface completely covered with an electrical conducting rubber envelope carrying several wires. Mr. Elliott expected that for efficient anti-icing 6 watts per sq in of blade surface must be applied to the leading edge, with a gradual reduction to one watt per sq in at the trailing edge.

Turning to hollow steel blades, Mr. Elliott said this type offered an opportunity for electrical heating internally, thus avoiding the loss in aerodynamic efficiency. The hollow steel blade also lent itself to the use of heated gas or hot air. In the spar type, the gas could be fed up into the cavities in leading and trailing edge portion by means of a muff surrounding the blade roots. This muff could be fed from suitable pick-up manifolds between engine and spinner, as shown in Fig. 5. Within the blade the hot gas could be distributed by holes through spars or ribs, and discharging through the trailing edge; centrifugal force would then assist in pumping the gas stream through.

Mr. Elliott gave the following comparative weight figures for the different systems; they applied to a four-engined aircraft with four-bladed airscrews, the cruising duration being 12 hours:

Fluid de-icing system	221 lb
Electric de-icing system (hub generator)	229 lb
Electric anti-icing system (engine-driven generator) ..	145 lb
Thermal anti-icing system by hot gas—negligible in combination with hot-gas grill or heated intake spinner.	

It would be seen that for a cruising duration of 12 hours there was little difference in weight between the fluid and the electrical hub-generator systems, but when engine-driven generators were used there was a saving of 76 lb over the fluid system. For a cruising range of 6½ hours' duration, the weights of the fluid and electrical systems with engine-driven generators would be about the same.

PARTY AT "THE LIMES"

Delegates to the Anglo-American Conference, Entertained at Sir Frederick Handley Page's House

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(Top) Mrs. Luby, Mr. Clark Millikan and Capt. M. Luby, R.N. (Left) Mr. A. E. Puckett, Mr. R. M. Stanley and Col. O. J. Ritland.

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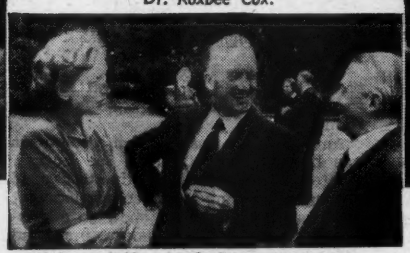
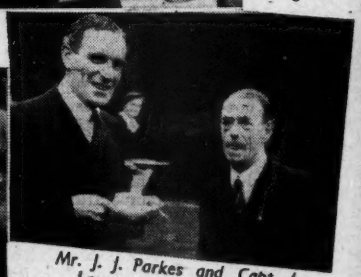
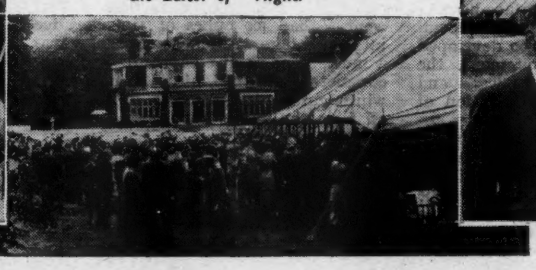


Mr. and Mrs. L. G. Frise with (right) the Editor of "Flight."



Mr. J. J. Parkes and Capt. J. Laurence Pritchard.

Mr. T. P. Wright with Sir Frederick Handley Page.



Mr. P. R. Bassett and Mr. A. G. Elliott.

AVRO TUDOR I. Designed for high speed, high altitude flight over long ranges, the Avro Tudor I is a fully pressurised airliner which sets a new standard of comfort. Alternative versions have been built which accommodate 12, 24 or 32 passengers. Fitted with four Rolls Royce Merlin Engines, the Avro Tudor I has a range of 3,100 miles carrying 32 passengers and 500 lb. of mail. Maximum cruising speed is 290 m.p.h. at 26,000 feet.

AVRO TUDOR II. The Avro Tudor II is the largest aeroplane yet built in Great Britain. Its fuselage, 105 feet long, is fully pressurised and a number of alternative layouts including a sleeper version are available. The latest radio and radar navigational aids form part of the comprehensive equipment. Carrying 60 passengers, baggage and cargo, the Avro Tudor II has a range of 1,420 miles, at a maximum cruising speed of 285 m.p.h. at 26,000 feet. Available with either Rolls Royce Merlin or Bristol Hercules engines.

HAWKER FURY

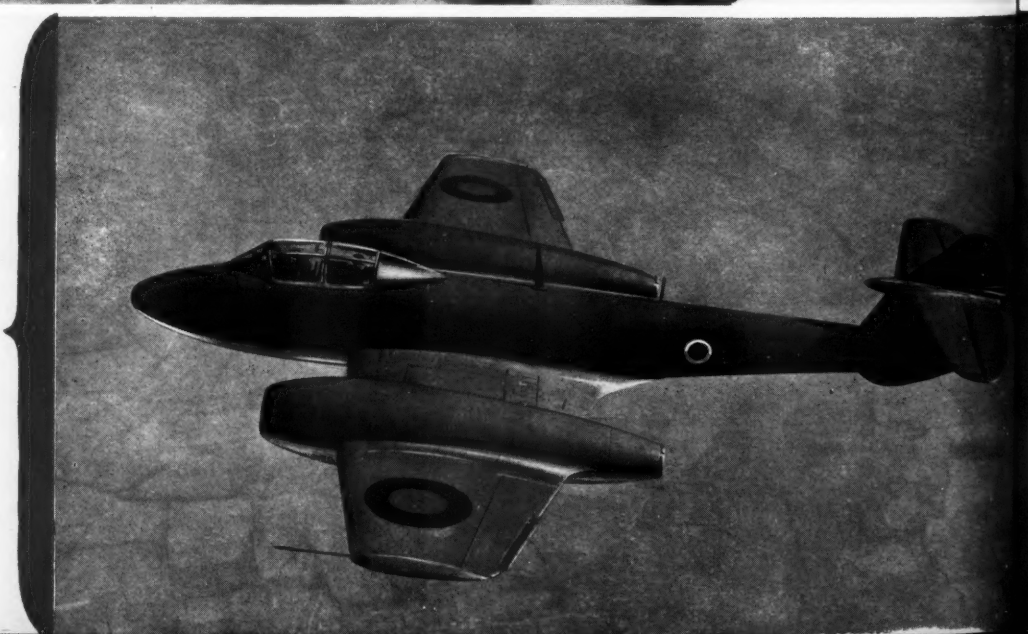
A high performance multi-purpose fighter aircraft powered by a single Bristol Centaurus XVIII radial engine, also available as a carrier borne fighter. The main armament is four 20 m.m. cannon, but additional equipment can include rocket projectiles, bombs, cameras etc. Provision is also made for two 90 gallon drop tanks. Max. speed 452 m.p.h. (730 km.p.h.) Max. range with drop tanks, 2,080 miles (3,050 km.).

GLOSTER METEOR IV

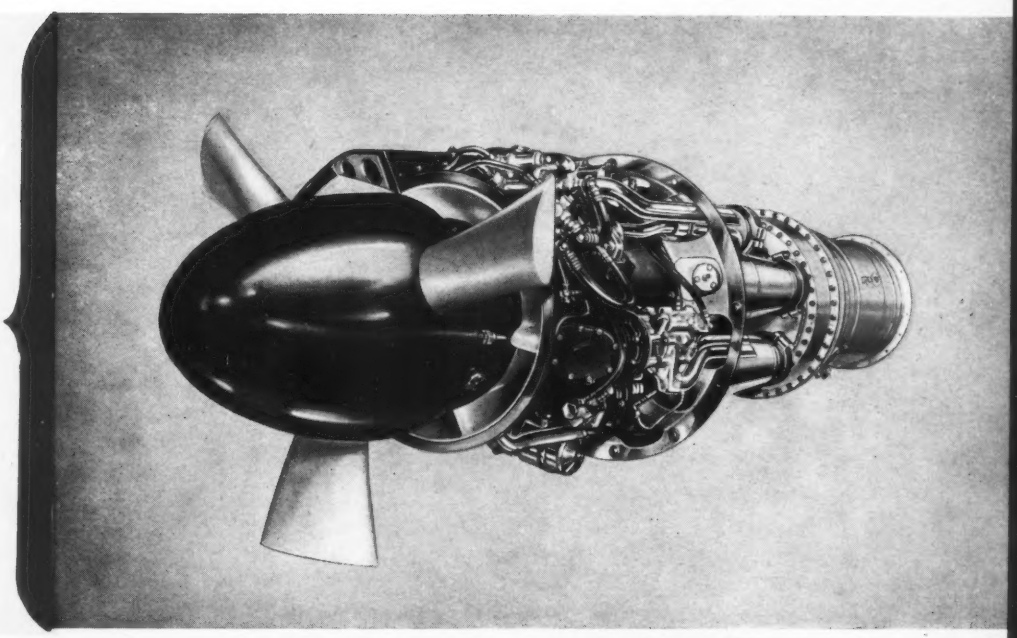
The fastest fighter in service today and adopted as standard by the R.A.F. Designed as a high altitude fighter, with a pressurised and heated cabin, it is readily adaptable to a wide range of operational duties. Facilities are available for carrying bombs, rocket projectiles or the extra equipment necessary for photo reconnaissance. Fitted with two Rolls Royce Derwent Turbo Jet units, it has a top speed in excess of 600 m.p.h.

THE GLOSTER METEOR TRAINER

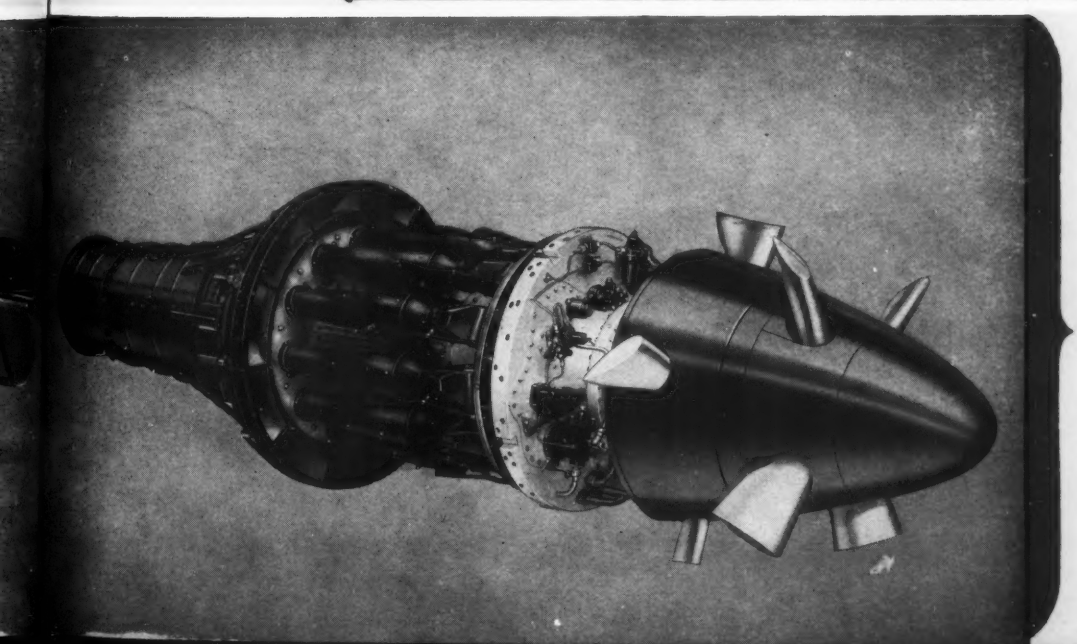
The first jet propelled dual instruction trainer. Designed to train pilots in the handling and navigating of 600 m.p.h. fighters. The METEOR trainer is virtually a two seater version of the famous METEOR IV, the basic airframe of which has been proved and tested under service conditions in all parts of the world. Stress analysis reveals an ultimate load factor of 9 G. with a Mach number of 0.82.
The METEOR Trainer is therefore an exceptionally fast aircraft with which the pilot can be gradually and safely introduced to the new 'Meteorific' performance of the modern jet propelled fighter.



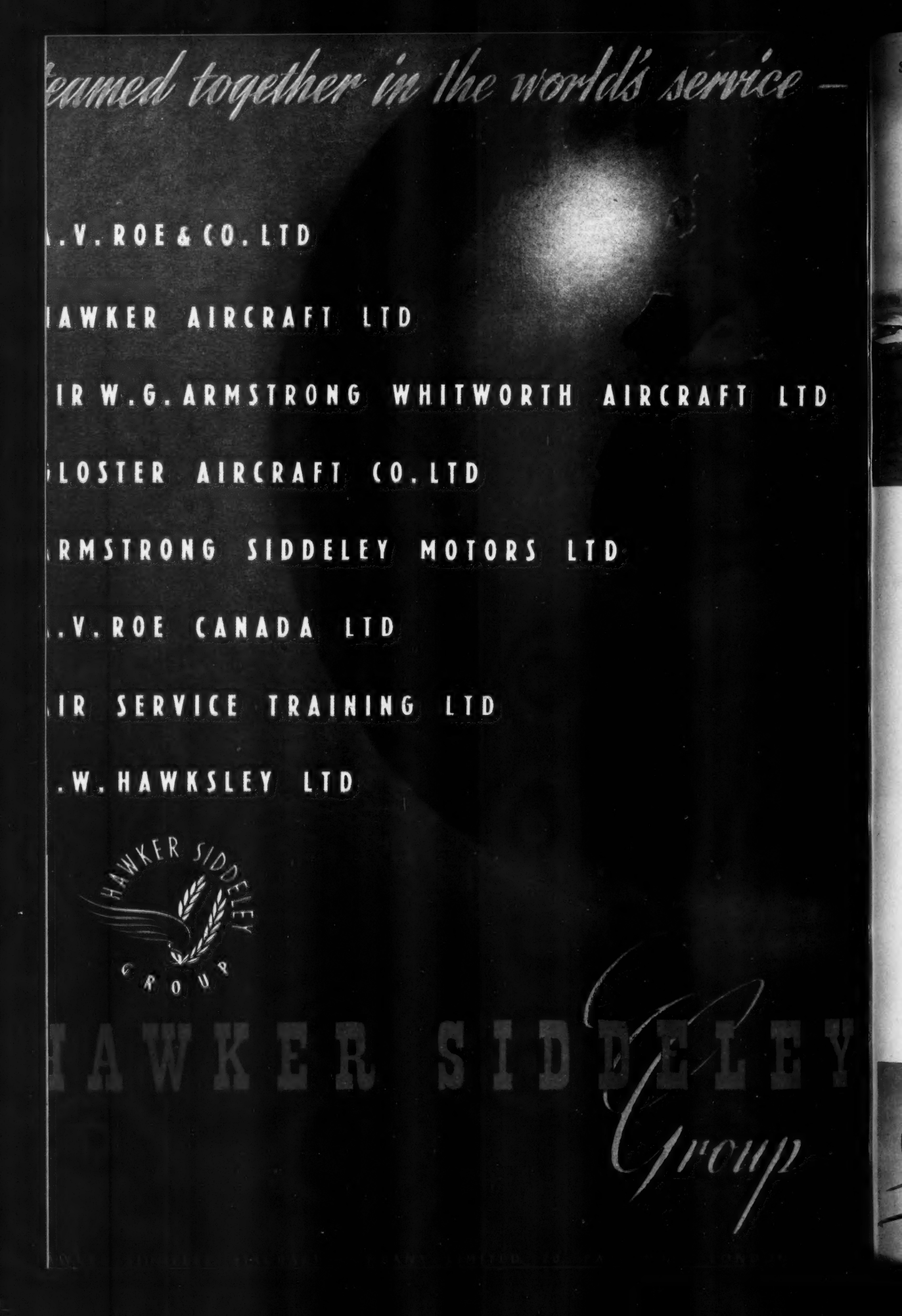
The A.W.55 "Apollo" — an all-metal general purpose transport aircraft carrying 24 to 31 passengers and freight with a crew of four in a fully pressurised and air-conditioned fuselage. Suitable for short and medium stage operation throughout the world. Powered by four Armstrong Siddeley "Mamba" gas turbine propeller units. Normal range 1,000 miles. Maximum speed 360 m.p.h. at 20,000 feet. Cruising speed 322 m.p.h.



MAMBA. The Mamba is a Gas Turbine Engine driving a propeller through a reduction gear. Suitable for the more moderate sizes of modern aircraft, it is remarkable for its very small diameter in relation to the total power delivered.



PYTHON. A detailed description of the Python engine is not yet permitted but it is designed along the lines of the A.S.K. Engine with the addition of a reduction gear driven from the front end of the compressor and contra-rotating airscrew shafts. Total power output is very large.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BRITISH AIRCRAFT

CURRENT DESIGNS FOR CIVIL AND MILITARY USES: PRODUCTS OF 27 FIRMS

AT the Society of British Aircraft Constructors' Display and Exhibition at Radlett this year manufacturers in this country will show, and in most cases demonstrate, something of every type and class of aircraft. As the production tempo of military aircraft continues to slow down, our efforts to produce commercial transports of all types and sizes gathers impetus. In the short space of two years, in spite of the many difficulties, more than a dozen passenger and freight aircraft, varying in size from light twins to large fours, have been designed, built and flown successfully. Perhaps more important are the designs, very advanced in conception and truly representative of post-war British thought, which are now taking form in many parts of the country.

In the following review of the British aircraft now flying, the summaries of their principal characteristics are classified under the headings: civil, projected and research, and military, in that order.

At present it may be said that the interim civil types are carrying the burden for the British airlines and the charter companies, but gradually the true post-war transports are taking their place, particularly in the light-twin categories.

Airspeed Consul

THE Consul is the most modern of a long line of Airspeed models, starting with the Envoy in 1934. In the same line the Oxford was used for training during the war, and long experience has resulted in this efficient civil aircraft. The Consul is being used extensively by charter companies for passenger and freight carrying, and could be conveniently converted for ambulance or other specialised work.

Construction	Wood
Power plant	Two A-S Cheetah X
Span	53ft 4in
Length	35ft 4in
Normal gross weight ...	8,850 lb
Cruising speed	140 m.p.h. at 47 per cent M.E.T.O. power at 10,000ft
Maximum speed	190 m.p.h. at 4,800ft
Typical payloads and ranges	695 lb, 950 miles 975 lb, 640 miles
Typical accommodation ...	Seating for 5 or 6 passengers and luggage

Airspeed Ambassador

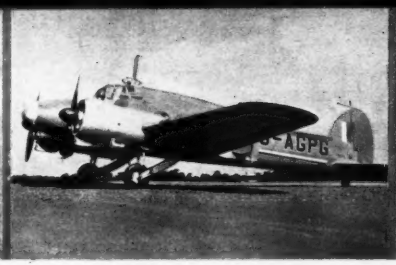
THE first prototype of this aircraft has already flown. The Ambassador, one of the products of Airspeed, Ltd., Christchurch, Hants, is suitable for development with reciprocating engines or airscrew turbines. The type of airscrew turbines to be fitted has not been decided, but four Naiads or two Proteus are being considered. Design will allow the final version to fly at an all-up weight of 52,500 lb. The Ambassador will comply with I.C.A.O. safety requirements.

Construction	Metal
Power plant	Two Bristol Centaurus 630
Span	115ft
Length	80ft 3in
Normal gross weight ...	47,000 lb
Cruising speed	282 m.p.h. at 83 per cent power at 10,000ft
Typical payloads and ranges	5,600 lb, 2,200 miles 8,400 lb, 1,000 miles
Typical accommodation ...	28 or 40 passengers and luggage

Auster Autocrat

MANUFACTURED by Auster Aircraft, Ltd., of Rearsby, Leicestershire, the Autocrat is used extensively by private owners and clubs and is a development of the earlier military aircraft. A two-seater version, powered by a Continental engine and weighing slightly less, is known as the Arrow. This version has a cruising speed of about 87 m.p.h. and a maximum speed of 98 m.p.h. Both models are economical all-purpose light aircraft and many are being operated in different parts of the world, in some instances under difficult conditions.

Construction	Metal (fabric-covered)
Power plant	Blackburn Cirrus II
Span	36ft
Length	23ft 5in
Normal gross weight ...	1,850 lb
Cruising speed	100 m.p.h. at 1,000ft
Maximum speed	120 m.p.h. at 1,000ft
Typical payload and range	608 lb, 320 miles
Typical accommodation ...	Pilot and 2 passengers



A. V. Roe Tudor II

WITH a longer fuselage than the Tudor I, the Mk. II is designed to fly shorter distances and carry more passengers. B.O.A.C. have twenty-six on order for use on the Empire routes. Several orders have also been received from overseas operators. The Tudor VII is a Mark II fuselage but powered by Hercules engines, so providing greater take-off power, a desirable feature for the Empire routes.

Construction	Metal
Power plant	Four R-R Merlin 600 series
Span	120 ft
Length	105ft 7in
Normal gross weight ...	80,000 lb
Cruising speed	270 m.p.h. at 15,000ft
Maximum speed	320 m.p.h. at 19,500ft
Typical payloads and ranges	9,354 lb, 2,450 miles 15,895 lb, 1,470 miles
Typical accommodation ...	Up to 60 passengers

A. V. Roe XIX

THE Avro XIX is the latest civil version of the Anson, and it has a greatly improved performance. Interior equipment is modern and a hydraulically operated undercarriage has been fitted. The A. V. Roe Canadian factory produced a Mk. V Anson powered by two Pratt and Whitney Wasp engines. Examples of this mark have also been converted for civil use. Development of both models has resulted from long experience with the military versions. Large-scale production has resulted in low initial cost.

Construction	Wood
Power plant	Two A-S Cheetah XV
Span	56ft 6in
Length	42ft 3in
Normal gross weight ...	10,400 lb
Cruising speed	150 m.p.h. at 5,000ft
Maximum speed	190 m.p.h. at 5,000ft
Typical payload and range	1,560 lb, 356 miles
Typical accommodation ...	6, 8 and 9-passenger versions

Avro Lancastrian

THE Lancastrian, manufactured by A. V. Roe, Ltd., of Greengate, Middleton, Manchester, is a conversion of the seven-year-old military Lancaster, and is used by the two British Corporations, B.O.A.C. and B.S.A.A. on regular passenger schedules. The type has also been found to be a useful flying test bed for prototype engines and has carried out successful tests for refuelling in the air.

Construction	Metal
Power plant	Four R-R Merlin T.24
Span	102ft
Length	76ft 10in
Normal gross weight ...	65,000 lb.
Cruising speed	280 m.p.h. at 11,000ft
Maximum speed	315 m.p.h. at 12,000ft
Typical payload and range	10,650 lb, 2,730 miles
Typical accommodation ...	13 passengers and 8,440 lb of baggage

A. V. Roe Tudor I

B.O.A.C. expect to operate a fleet of Tudor I aircraft on the North Atlantic route, and sixteen have been ordered. Much attention has been paid to the comfort of passengers in B.O.A.C. Tudors. The Tudor IV is a variant of the Mk. I but with a longer fuselage. B.S.A.A. expect to commence operations with this mark during this month.

Construction	Metal
Power plant	Four R-R Merlin 621
Span	120ft
Length	79ft 6in
Normal gross weight ...	80,000 lb
Cruising speed	280 m.p.h. at 15,000ft
Maximum speed	325 m.p.h. at 19,500ft
Typical payload and range	5,746 lb, 3,700 miles
Typical accommodation ...	24 day and 12 night-passenger versions

A. V. Roe York

THE York was constructed as an interim transport for the immediate post-war period. The type was first of all put into service with the R.A.F. Transport Command, but since the end of the war has flown with B.O.A.C., B.S.A.A., and other airlines, on regular services on long distance routes. Normal interior arrangement provides spacious accommodation in separate cabins joined by a central gangway.

Construction	Metal
Power plant	Four R-R Merlin T.24
Span	102ft
Length	78ft
Normal gross weight ...	71,000 lb
Cruising speed	260 m.p.h. at 10,500ft
Maximum speed	315 m.p.h. at 10,800ft
Typical payload and range	7,000 lb, 2,600 miles
Typical accommodation ...	21 passengers and 2,380 lb of freight

Chrislea Ace

FEATURES of the Chrislea Ace include very simple operation, there being only two controls. There is no rudder bar, and all surfaces are controlled by means of a steering-wheel-type control column. Manufactured by the Chrislea Aircraft Co., of Exeter Airport, Clyst, Honiton, Devon, the Ace has a tricycle undercarriage. Production has been delayed by the Company's move from Heston.

Construction	Metal (fabric-covered)
Power plant	Lycoming 0.290.3
Span	36ft
Length	20ft 6in
Normal gross weight ...	1,950 lb
Cruising speed	111 m.p.h. at 85 per cent M.E.T.O. power at 2,000ft
Maximum speed	123 m.p.h. at sea level
Typical payloads and ranges	560 lb, 650 miles 730 lb, 280 miles
Typical accommodation ...	Pilot and 3 passengers

Bristol 170 (Wayfarer and Freighter)

FREQUENTLY referred to as the "tramp ship of the air," the two versions of the Bristol 170 fulfil several functions. The Bristol Aircraft Co., of Filton, Bristol, the manufacturers of this aircraft, have delivered many to overseas carriers, especially in the freighter form. There has been a suggestion that a version should be produced, with Centaurus engines, so giving better take-off power and single engine performance.

Construction	Metal
Power plant	Two Bristol Hercules 131
Span	98ft
Length	68ft 4in
Normal gross weight ...	37,000 lb
Cruising speed	153 m.p.h. at 50 per cent power at 5,000ft
Maximum speed	224 m.p.h. at 5,000ft
Typical payloads and ranges	Freighter: 7,544 lb, 835 miles 10,749 lb, 200 miles. Wayfarer: 4,475 lb, 950 miles 7,549 lb, 200 miles
Typical accommodation ...	32 passengers

De Havilland Dove

ALREADY forty-three Doves have been delivered to charter operators in this country and to airline and charter operators abroad. Production of this type by the de Havilland Aircraft Co., of Hatfield, Herts, started very soon after the war. It has a high performance, tricycle undercarriage and carries modern passenger, freight and flying equipment. A development has been suggested in the form of a Dove powered by airscrew turbines.

Construction	Metal
Power plant	Two D.H. Gipsy Queen Series 70
Span	57ft
Length	39ft 4in
Normal gross weight ...	8,500 lb
Cruising speed	155 m.p.h. at 50 per cent T.O. power at 5,000ft
Maximum speed	210 m.p.h. at 8,000ft
Typical payload and range	1,812 lb, 500 miles
Typical accommodation ...	Up to 11 passengers

Elliotts' Newbury Eon

THE prototype of this aircraft, designed by Elliotts of Newbury, Ltd., of Albert Works, Newbury, is of low-wing, conventional design, with a tricycle undercarriage. The first machine has flown but flight tests are not yet complete. Further prototypes with larger engines are in course of manufacture, and these will be arranged to carry four passengers instead of three. Further details and performance figures are to be released very shortly, on completion of trials.

Construction	Wood
Power plant	Blackburn Cirrus Minor
Span	37ft
Length	25ft 3in
Typical accommodation ...	3 or 4 passengers

Cunliffe-Owen Concordia

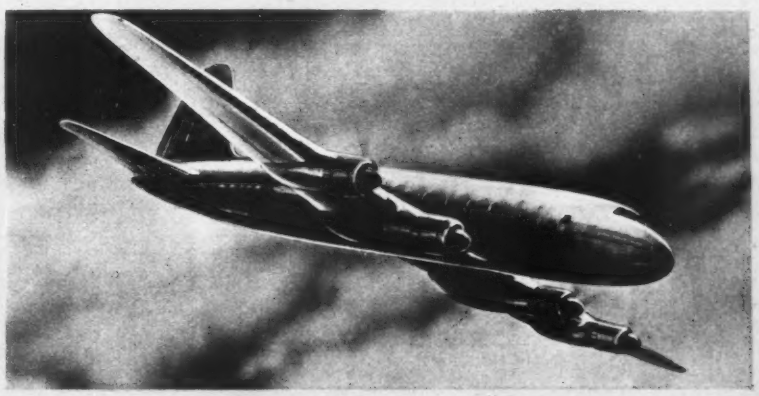
THIS aircraft, the second prototype of which is now flying, is suitable for feeder line passenger operations or as an ambulance or freighter. Manufactured by Cunliffe-Owen Aircraft, Ltd., of Swaythling, Southampton, it has a tricycle undercarriage and the new type Rotol three-blade airscrew with reverse thrust braking if required. The Concordia is the first aircraft to fly with Alvis Leonides engines.

Construction	Metal
Power Plant	Two Alvis Leonides LE.4M
Span	56ft 8in
Length	44ft 10in
Normal gross weight ...	12,500 lb
Cruising speed	194 m.p.h. at 9,500ft
Maximum speed	216 m.p.h. at 3,000ft
Typical payloads and ranges	1,930 lb, 1,130 miles 2,100 lb, 900 miles
Typical accommodation ...	10 passengers

Handley Page Hermes IV

B.O.A.C. have twenty-five Hermes IV aircraft on order. The cabin is pressurized and soundproofed, and the aircraft is equipped with a tricycle undercarriage, reversible pitch airscrews and nosewheel steering. A development of the Mk. IV will be the Hermes V, powered by four Bristol Theseus engines. The Mark I Hermes, with a three-point undercarriage, will not go into production and may be regarded as the prototype for the later models.

Construction	Metal
Power plant	4 Bristol Hercules 763
Span	113ft
Length	97ft
Normal gross weight ...	82,000 lb
Cruising speed	297 m.p.h. at 25,000 ft
Maximum speed	357 m.p.h. at 20,000ft
Typical payloads and ranges	15,860 lb, 1,820 miles
Typical accommodation ...	40 passengers



Miles Gemini

DESIGNED as a private aircraft, the Gemini is a low-wing cabin monoplane with retractable undercarriage. Height can be maintained on one engine and sufficient fuel may be carried for more than six hours' continuous flight. At an all-up weight of 2,800 lb the distance for actual take-off, against a 5 m.p.h. wind, is 120 yards, and the stalling speed is 35 m.p.h. Several British charter operators are using the Gemini for taxi passenger flying and many have been flown overseas.

Construction	Wood
Power plant	Two Blackburn Cirrus Minor
Span	36ft 2in
Length	22ft 3in
Normal gross weight ...	3,000 lb
Cruising speed	135 m.p.h. at sea leve
Maximum speed	150 m.p.h. at sea level
Typical payloads and ranges	786 lb, 555 miles 570 lb, 1,015 miles*
Typical accommodation ...	Pilot and 3 passengers

*With auxiliary tanks

Handley Page Halton

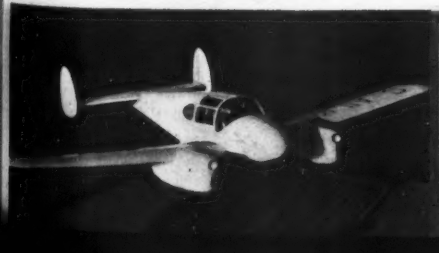
IN reality a civil conversion of the military Halifax, the Halton is flying on B.O.A.C. routes in passenger form and with several British charter companies carrying freight. This aircraft is a product of Handley Page, Ltd., of Cricklewood, London. The Halifax C. VIII is a parallel development designed for use as a military transport. War development has made available an aircraft suitable for the interim period, on favourable terms to purchasers.

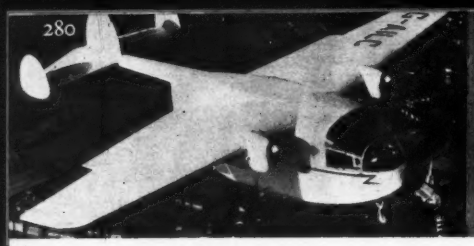
Construction	Metal
Power plant	Four Bristol Hercules 100
Span	103ft 8in
Length	73ft 7in
Normal gross weight ...	65,000 lb
Cruising speed	270 m.p.h. m.w.m. at 15,000ft 210 m.p.h. e.w.m. at 15,000ft
Maximum speed	320 m.p.h. at 15,000ft
Typical payloads and ranges	5,550 lb, 2,530 miles
Typical accommodation ...	10 passengers and 8,000 lb. freight

Miles Messenger

ORIGINALLY designed as an Army observation aircraft the M. 38, the Messenger is capable of taking off in a very short distance. It has also been designed to provide unrestricted vision in all directions and to operate with the minimum of unskilled maintenance under adverse conditions. The stall is particularly low, the take-off run is 75 yards with a 5 m.p.h. headwind, and it is almost foolproof in handling. With full flaps the approach can be made at 45 m.p.h. The side-by-side front seats have dual controls.

Construction	Wood
Power plant	Blackburn Cirrus Major III
Span	36ft. 2in
Length	24ft
Normal gross weight ...	2,400 lb
Cruising speed	124 m.p.h. at sea level
Maximum speed	135 m.p.h. at sea level
Typical payload and range	773 lb, 460 miles
Typical accommodation ...	3 passengers and 265 lb baggage





Miles Aerovan

THE Aerovan is built by Miles Aircraft, Ltd., of Reading, Berks, and is described as a light freighter or feeder line aircraft. The high tail boom construction allows easy access to the cabin through a large rear door. The cabin is close to the ground and the Aerovan, being fitted with a tricycle undercarriage, is always in level position. At a normal all-up weight of 5,400 lb, the take-off run in a 5 m.p.h. wind is 200 yards, and the ceiling is 13,000 ft. The M.68, a unique development with detachable fuselage and 4 Cirrus Minor engines has recently flown.

Construction	Composite
Power plant	Two Blackburn Cirrus Major III
Span	50ft
Length	36ft
Normal gross weight ...	5,800 lb
Cruising speed ...	112 m.p.h. at sea leve
Maximum speed	127 m.p.h. at sea level
Typical payloads and ranges	2,240 lb, 400 miles 1,875 lb, 800 miles*
Typical accommodation ...	9 passengers or cubic capacity of 530 cu ft

*With auxiliary tanks

Portsmouth Aerocar

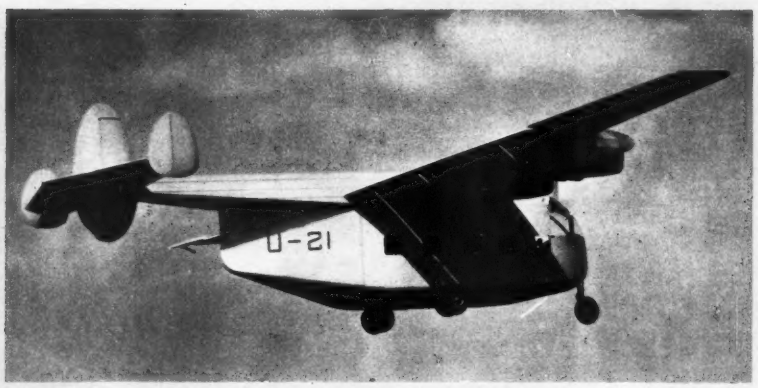
THERE are four models, the Major and Minor, Senior and Junior. All models are equipped with a steerable tricycle undercarriage, retractable only on the Major and Minor, but the Senior and Junior have simplified equipment to reduce initial cost. Two doors permit entry for passengers and the rear portion of the cabin hinges upwards to provide access for freight. The manufacturers, Portsmouth Aviation, Ltd., of The Airport, Portsmouth, have constructed the prototype, which flew last June, in metal and wood, but production aircraft will be all-metal.

Construction	Metal
Power plant	Two Blackburn Cirrus Major III
Span	42ft
Length	26ft 3in.
Normal gross weight ...	3,950 lb
Cruising speed	136 m.p.h. at 65 per cent M.E.T.O. power at 5,000ft
Maximum speed	164 m.p.h. at 5,000ft
Typical payload and range	1,000 lb, 500 miles
Typical accommodation ...	5 passengers

Miles Marathon

THE Marathon was built to the official Brabazon 5A requirements, for a medium-sized airliner. It is a high wing monoplane fitted with a tricycle retractable undercarriage. Airscrew turbines may be installed without any major modifications, and two Armstrong-Siddeley Mamba engines will be installed in the first turbine-engined prototype, which is at present known as the M.69. The Marathon has been designed to meet I.C.A.O. safety requirements. British European Airways have thirty on order for use on the Corporation's services.

Construction	Metal
Power plant	Four Gipsy Queen 71
Span	65ft
Length	52ft 11in
Normal gross weight ...	16,500 lb.
Cruising speed	175 m.p.h. at 50 per cent M.E.T.O. power at 10,000ft
Maximum speed	230 m.p.h. at 6,300ft
Typical payload and range	2,800 lb, 900 miles
Typical accommodation ...	18 passengers



Miles Merchantman

THE Merchantman is a natural outcome from the Aerovan, with the same layout, but constructed entirely in metal and with a greater capacity. Design of the fuselage is similar, but the main cabin has a capacity of 780 cu ft The tricycle undercarriage is fixed and the nosewheel, as on the Aerovan, is connected to the rudder bar for steering purposes on the ground. The first prototype Merchantman flew last month.

Construction	Metal
Power plant	Four D.H. Gipsy Queen 30
Span	66ft 6in
Length	42ft 9in
Normal gross weight ...	13,000 lb.
Cruising speed	143 m.p.h. at 5,000ft (65 per cent T.O. power)
Maximum speed	157 m.p.h. at 5,000ft
Typical payload and range	Over 2 tons, 965 miles
Typical accommodation ...	20 passengers

Percival Merganser

THE Merganser has been designed by Percival Aircraft, Ltd., of Luton, Beds, to provide a wide range of alternative cabin arrangements for feeder services or charter work, or even as a private aircraft. The main units of the retractable tricycle undercarriage are mounted at the engine nacelles. A direct development at present under construction will be known as the Prince. That version will be powered by two Alvis Leonides, will have a span of 56 ft, and the length extended by 8 in. The normal weight will be 9,700 lb and the maximum speed, 227 m.p.h. at 5,000 ft.

Construction	Metal
Power plant	Two D.H. Gipsy Queen 51
Span	47ft 9in
Length	38ft 11in
Normal gross weight ...	6,700 lb
Cruising speed	160 m.p.h. at 68 per cent power at 5,000ft
Maximum speed	193 m.p.h. at 5,000ft
Typical payload and range	1,350 lb, 800 miles
Typical accommodation ...	6 passengers

Scottish Aviation Prestwick Pioneer

DESIGNED primarily for operation in areas where, due to geographical considerations and low population density, airfield facilities are not available or are restricted, the Prestwick Pioneer can be supplied as a landplane, skiplane or float seaplane. The manufacturers, Scottish Aviation, Ltd., of Prestwick, Ayr, have recently flown the first prototype. The undercarriage is fixed. Leading edge all-metal full-span slats, and all-metal flaps, with split flaps are provided.

Construction	Metal
Power plant	D.H. Gipsy Queen 34
Span	50ft 6in
Length	34ft 9in
Normal gross weight ...	3,650 lb
Cruising speed	110 m.p.h. at 5,000ft
Maximum speed	126 m.p.h. at 5,000ft
Maximum range	500 miles
Typical accommodation ...	Pilot and 3 passengers

Percival Proctor V

LATEST product of the Proctor series is the Mk. V. The aircraft is a fixed undercarriage four-seater cabin monoplane, of wooden construction. Earlier aircraft in the series were used during the war for communication purposes by the Services, and they are being used extensively by charter companies in this country and abroad. There have been recent successful tests with a Proctor on floats to be known as the Mk. VI.

Construction	Wood
Power plant	D.H. Gipsy Queen Six II
Span	39ft 6in
Length	28ft 2in
Normal gross weight ...	3,500 lb
Cruising speed	135 m.p.h. at 68 per cent M.E.T.O. power at sea level
Maximum speed	157 m.p.h. at sea level
Typical payloads and ranges	350 lb, 800 miles 729 lb, 250 miles
Typical accommodation ...	Pilot and 3 passengers

Short Sandringham

THERE are six marks of the Sandringham flying boat, built by Short Bros., of Rochester, Kent, and each may be fitted with either Bristol Pegasus 38 or Pratt and Whitney Twin Wasp engines, according to the customer's requirements. Basically the aircraft is a Sunderland. The B.O.A.C. Sandringhams with American engines, and known as the Plymouth Class, are equipped to provide for twenty-four day or sixteen night passengers. Other marks take twenty-one, thirty or thirty-seven passengers.

Construction	Metal
Power plant	Four Bristol Pegasus 38
Span	112ft 9in
Length	86ft 3in
Normal gross weight ...	56,000 lb
Cruising speed	188 m.p.h. (m.w.m.) at 9,000ft
Maximum speed ...	215 m.p.h. at sea level
Typical payloads and ranges	3,780 lb, 1,985 nautical miles; 11,500 lb, 870 nautical miles.
Typical accommodation	45 passengers

Short Solent

THE Solent is the civil version of the R.A.F. Seaford, and twelve have been ordered by B.O.A.C. for passenger services on the Empire routes. The hull is divided into two decks connected by a staircase, and accommodation has been arranged in cabins and lounges. In the B.O.A.C. aircraft each cabin may be instantly converted for sleeping passengers. The crew accommodation is spacious and the standard radio and radar equipment is comprehensive. Instead of a 30-seat layout, provision is now to be made for 34 passengers.

Construction	Metal
Power plant	Four Bristol Hercules 637
Span	112ft 9in
Length	89ft 6in
Normal gross weight ...	75,000 lb
Cruising speed	238 m.p.h. (m.w.m.) at 9,200ft
Maximum speed ...	268 m.p.h. at 7,200ft
Typical payloads and ranges	2,750 lb, 3,020 miles; 13,220 lb, 1,600 miles.
Typical accommodation	34 passengers

Vickers-Armstrongs (Supermarine) Sea Otter

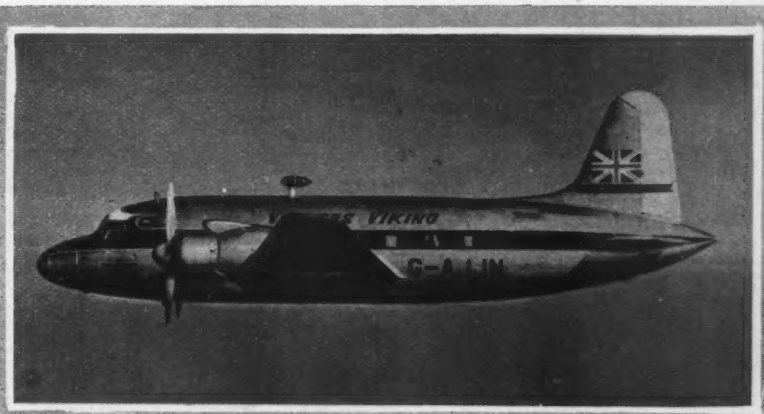
DESIGNED to replace the Walrus for reconnaissance and A/S.R. duties, the Sea Otter I was produced before the war at the Supermarine Works, Hursley Park, Winchester, Hants. The military model has now been converted for civilian use and is available as a short-range four-passenger amphibian. The single Bristol Mercury power unit drives a Rotol three-blade constant-speed tractor airscrew. Slinging gear and folding wings are standard equipment and provision for catapulting can be supplied.

Construction	Metal
Power plant	Bristol Mercury 30
Span	46ft
Length	39ft 9in
Normal gross weight ...	10,000 lb
Cruising speed	100 m.p.h. at 5,000ft
Maximum speed. ...	150 m.p.h. at 5,000ft
Typical payload and range	1,015 lb, 690 miles.
Typical accommodation	Four passengers

Vickers-Armstrongs Viking

IN two standard versions, one to carry twenty-four, the other to carry twenty-seven passengers, Vikings, manufactured by Vickers-Armstrongs, Ltd., of Weybridge, Surrey, are flying on routes to the Continent with British European Airways, with many airlines overseas and with charter companies in the U.K. The King's Flight is equipped with four Vikings.

Construction	Metal
Power plant	Two Bristol Hercules 634
Span	89ft 3in
Length	65ft 2in
Normal gross weight ...	34,000 lb
Cruising speed	210 m.p.h. at 10,000ft.
Maximum speed ...	296 m.p.h. at 8,000ft
Typical payloads and ranges	5,375 lb, 1,450 miles 7,860 lb, 270 miles
Typical accommodation	24 or 27 passengers.



RESEARCH AND PROJECT

TO an increasing extent Britain's future in the air is becoming dependent upon the performance and behaviour of pure research aircraft. This is forcibly illustrated by the D.H.108, the exploratory precursor of the 75,000-lb transatlantic D.H.106. Sixteen of these critically important pure-jet 500 m.p.h. transports have already been ordered, and upon their quality rests, to a large degree, our national prestige. For investigations in the transonic speed range Vickers rocket-powered models are to be launched from a Mosquito.

Valuable data and experience have been amassed as the result of trials with towed gliders of unorthodox design, exemplified by the A.W.52G, forerunner of the twin-Nene all-wing A.W.52 piloted research machine, and by a series of General Aircraft research gliders.

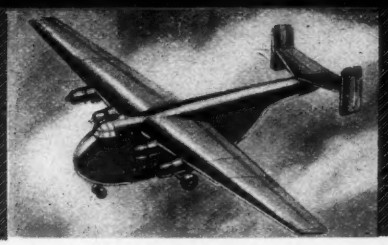
A new class of aircraft which is proving vitally important to technical development is the flying test-bed for new forms of power plant. It has become customary to displace the outboard piston engines of Lancastrians or Lincolns by turbo jets or airscrew turbines. A Python-Lincoln is projected and other machines will be adapted for the installation of small airscrew turbines. Both the Meteor and Vampire have been flown with non-standard power plants.

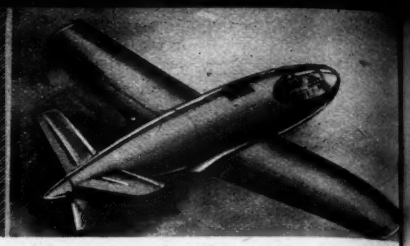
The projected turbine-powered civil transport aircraft described here are more orthodox in concept than the D.H.106, but their specifications show that British designers are aiming high, not only in respect of performance, but in securing much greater safety than is offered by current types. To meet an urgent B.O.A.C. requirement for an economical transport for Empire routes, carrying about 11,000 lb payload, the Ministry of Supply has asked for tenders. These "M.R.(E)" designs are under consideration.

Armstrong Whitworth Apollo

ARMSTRONG WHITWORTH AIRCRAFT, LTD., of Baginton, near Coventry, have designed the Apollo as a general purpose transport aircraft for short and medium-range flying. The first objective has been to attain an exceptional standard of safety, and the measures include the fitting of gas turbines, gust alleviators and a long-travel tricycle undercarriage to enable the aircraft to glide unchecked to the ground. Other features include a hydraulically operated second rudder to check yaw caused by engine failure, twin main and nosewheels, and thermal anti-icing.

Construction	Metal
Power plant	Four A-S Mamba
Span	92ft
Length	70ft 11in
Normal gross weight ...	39,500 lb
Cruising speed	305 m.p.h. at 20,000ft
Typical payload and range	7,500 lb., 1,500 miles at 20,000ft
Typical accommodation	31 passengers.





Essex Aero Sprite

THE prototype of the Sprite constructed by the Essex Aero Co., of Gravesend, Kent, is expected to fly within a year. It has been designed for private owner use and the cabin has accommodation for a pilot and passenger. The entire aircraft will be constructed of magnesium alloy, and will eventually be produced in two forms, with a retractable and fixed undercarriage. Production will depend largely upon delivery of the Nuffield engine, and the Satellite will be the first production aircraft to fly with that power unit.

Construction	Metal
Power plant	Nuffield Flat-four 100 h.p.
Span	30ft
Length	24ft 7in
Normal gross weight ...	1,548 lb
Cruising speed	131 m.p.h. at 1,000ft
Maximum speed ...	149 m.p.h.
Typical payloads and ranges	669 lb, 305 miles

General Aircraft Universal

THE Universal, under construction by General Aircraft, Ltd., of Feltham, Middlesex, has been designed to fly high percentage payloads over relatively short routes. As a passenger transport the fuselage has a double deck arrangement, but in freighter form there is unrestricted cargo space which measures up to 15ft high by 10ft wide by 36ft long. Only the nose wheel of the tricycle undercarriage is retractable. Thermal de-icing will be used for wings and tail surfaces.

Construction	Metal
Power plant	Four Bristol Hercules 260
Span	162ft
Length	99ft 2in
Normal gross weight ...	95,000 lb
Cruising speed	186 m.p.h. at 8,000ft
Maximum speed	239 m.p.h. at 13,500ft
Typical payloads and ranges	28,530 lb, 752 miles 18,250 lb, 1,835 miles
Typical accommodation	Up to 90 passengers

Planet Satellite

PLANET AIRCRAFT, of 29, Clarges Street, Piccadilly, London, W.1, have designed the Satellite, a unique aircraft with retractable tricycle undercarriage and a "buried" engine, located behind the cabin, which drives a pusher propeller through a long shaft in the tail. The rear section of the fuselage is a detachable monocoque structure, and the wings are semi-monocoque. An alternative version, powered with a Gipsy Major 10 engine, will probably be available at a much cheaper price. The prototype is expected to fly next month.

Construction	Metal
Power plant	D.H. Gipsy Queen 31
Span	33ft 6in
Length	26ft 2½in
Normal gross weight ...	2,905 lb
Cruising speed	191 m.p.h. (m.w.m.)
Maximum speed ...	208 m.p.h. at S.L.
Typical payload and range	925 lb, 1,000 miles
Typical accommodation	Pilot and three passengers

Bristol 167 (Brabazon)

DESIGNED by the Bristol Aircraft Company to the requirements of the Brabazon I specification, the Bristol Type 167 is the biggest landplane yet to be built in the United Kingdom. The first prototype, which is expected to fly in 1948, will be used for experimental purposes, but the second aircraft, powered by four pairs of Bristol Proteus airscrew turbines, will be the first of three which are to fly regular services on the North Atlantic route.

Construction	Metal
Power plant	Eight Bristol Centaurus
Span	230ft
Length	177ft
Normal gross weight ...	285,000 lb
Cruising speed	250 m.p.h. at 25,000ft
Maximum speed ...	300+ m.p.h. at 25,000ft
Still air range	5,000 miles
Typical accommodation	100 passengers

Saunders-Roe S.R.45

AN order has been placed by the Ministry of Supply for three S.R.45 flying-boats built by Saunders-Roe, Ltd., of East Cowes, Isle of Wight. The hull is of figure-8 section and is divided into two decks, the intersection of the two circles of the figure forming the floor of the upper deck. The whole of the passenger, crew and luggage space will be fully pressurized and air-conditioned. The S.R.45 will be fitted with a Saunders-Roe automatic mooring device and retractable stabilizing floats under the wing-tips. A full-size mock-up is being used to decide final details of the cabin layout. The first prototype is expected to fly in 1948.

Construction	Metal
Power plant	Ten Bristol Proteus
Span	220ft
Length	148ft
Normal gross weight ...	302,400 lb
Cruising speed	Over 350 m.p.h.
Still air range	5,500 miles
Typical accommodation	Up to 100 passengers

Short Sealand

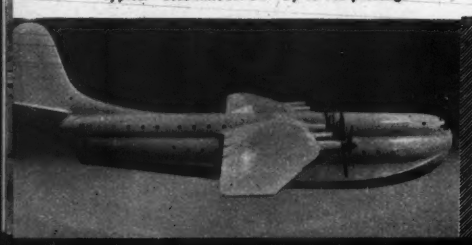
THE Sealand is an amphibian under construction by Short Bros. which has been designed for feeder line services, charter operation or as a private transport for large organizations flying to remote airfields or stretches of water. The undercarriage retracts into the hull sides and the tailwheel, which acts as a rudder when the amphibian is on the water, retracts to a position under the tail. The Sealand may be converted for freight-carrying, and the passenger entrance may be adapted as a large hatch for easy loading. A version with Alvis Leonides engines is proposed.

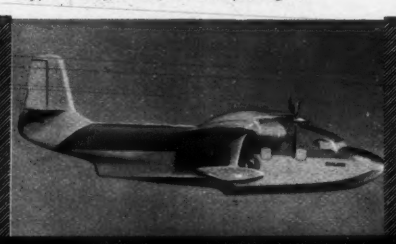
Construction	Metal
Power plant	Two D.H. Gipsy Queen 71
Span	59ft
Length	42ft
Normal gross weight ...	8,500 lb
Cruising speed	179 m.p.h. (m.w.m.) at 6,600ft
Maximum speed ...	193 m.p.h. at 6,200ft
Typical payload and range	1,600 lb, 620 miles
Typical accommodation	Five passengers

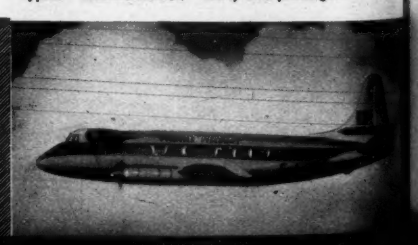
Vickers-Armstrongs Viscount

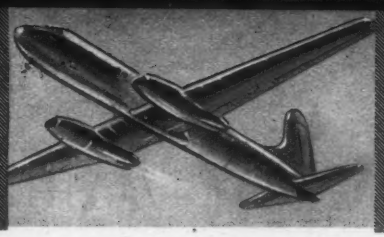
PROTOTYPES of the Viscount, hitherto known as the Viceroy, or V.C. Eight, are under construction by Vickers-Armstrongs at Weybridge, and it is possible that the type will eventually replace Vikings on the British European Airways' services on European routes. The fuselage is pressurized but the type of power unit to be installed has not yet been decided, although Mamba or Dart were originally specified. Lengthy development and test flying is planned but Viscounts will probably be flying on passenger services in 1950. Although the span of the Viscount is the same as the Viking the fuselage is nearly 10ft longer, permitting increased accommodation.

Construction	Metal
Power plant	Four airscrew turbines
Span	89ft
Length	74ft 6in
Normal gross weight ...	38,500 lb
Cruising speed	325 m.p.h. at 30,000ft
Range	1,700 miles
Typical accommodation	Thirty-two passengers









Armstrong Whitworth A.W.52

THE basic aerodynamic design having been proved by extensive test flying with a glider (A.W.52G) the A.W.52 all-wing research aircraft, powered by two Rolls-Royce Nene turbo jets, is shortly due to make its first flight. Apart from the swept-back wing this machine embodies a number of features which have hitherto progressed little further than the drawing board, e.g., boundary layer control by suction, a pressurized crew-compartment and a steerable nose wheel. The boundary layer control does not alter appreciably the stalling speed of the aircraft, but delays the loss of control due to wing-tip stalling.

Construction	Metal
Power plant	Two Rolls-Royce Nene
Span	90ft
Length	37ft 4in
Gross weight	32,700 lb
Wing area	1,314 sq ft

Tudor VIII

PROBLEMS associated with high-speed, long-range transport aircraft fitted with pure jet units will be investigated in this mark of the Avro Tudor, soon to be air-tested. Displacing the four Merlins or Hercules of piston-engined Tudors are four Rolls-Royce Nene turbo jets, paired in two nacelles. The fuselage and wing structures are basically those of the Tudor I and the cabin is fully pressurized. The Nene-Tudor should be capable of experimental flights across the Atlantic.

Six feet have been added to the fuselage for aerodynamic reasons and the Tudor VIII is therefore most similar to the Tudor IV.

Construction	Metal
Power plant	Four Rolls-Royce Nene in pairs
Span	120ft
Length	85ft

Theseus-Lincoln

SINCE its first flight on February 17th this year the Avro Lincoln powered by two Bristol Theseus airscrew turbines in the outboard position has been subjected to an exacting programme of air testing and development work. One point which has been proved is that a wide band of operating speeds might be used for the Theseus without appreciable reduction of power output, a fact which may prove highly important on future types of civil transport aircraft in keeping down airscrew r.p.m. and therefore noise.

Construction	Metal
Power plant	Two Rolls-Royce Merlin 85 and two Bristol Theseus
Span	120ft
Length	78ft 9in
Weight empty	49,500 lb
Individual power plant wt.	Merlin, 2,685 lb ; Theseus TH.11 2,790 lb

D.H.108

THE D.H.108 research aircraft which is likely to appear at Radlett, differs in certain minor respects from that in which Mr. Geoffrey de Havilland lost his life, after he had unofficially exceeded by a wide margin the world's air speed record then standing (616 m.p.h.). Built primarily for investigation of the problems associated with swept-back wings the 108 has no horizontal tail surfaces. Experience with the design will be applied to the D.H.106 75,000-lb trans-atlantic air liner which will be powered by four Ghost turbo-jets. The 108 is fitted with a specially rated Goblin.

Construction	Composite
Power plant	One de Havilland Goblin 3
Span	39ft (approx.)
Length	26ft (approx.)
Speed	650 m.p.h. (approx.)

Nene-Vampire

THE Nene and Ghost-powered Lancastrians have been supplemented by special versions of the de Havilland Vampire fighter for testing the Nene and Ghost at high speeds and extreme altitudes. Already the Nene-Vampire has attained a height of 51,000 feet while on test. The Nene-Vampire has been flown with and without supplementary air intakes on the nacelle but these are not fitted on the Ghost version.

The fuselage of the Vampire is lengthened by a few inches to take the Ghost, but the diameter is not increased.

Aerodynamic considerations restrict the maximum level speed of the Ghost and Nene-Vampire, but an exceptional rate of climb is attained.

Construction	Metal
Power plant	One Rolls-Royce Nene (or D.H. Ghost)
Span	40ft
Length	30ft 9in
Speed	Over 540 m.p.h.

Trent-Meteor

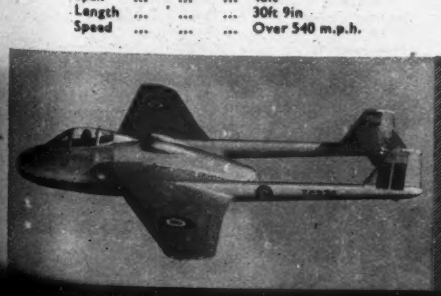
VALUABLE data on the behaviour of airscrew turbines generally and on reduction gear and airscrew problems in particular have been obtained by Rolls-Royce, Ltd., from a modified Gloster Meteor powered by Rolls-Royce Trents. The Trent is basically a Derwent II modified to drive an airscrew, and gives a power output of 750 s.h.p. plus 1,000 lb jet thrust. There is no intention of putting the Trent into production, but the practical experience gained is being applied to more powerful Rolls-Royce airscrew turbines such as the Dart and Clyde. During a public display at Derby this year a Rolls-Royce test pilot demonstrated the remarkable acceleration of the Trent-Meteor.

Construction	Metal
Power plant	Two Rolls-Royce Trent (experimental airscrew turbine)
Span	43ft
Length	41ft

Ghost-Lancastrian

DEVELOPMENT of the D.H. Ghost turbo-jet, particularly in respect of reliability and fuel consumption, will be undertaken with the aid of a specially modified Avro Lancastrian aircraft fitted with two Ghosts in the outboard positions. The Ghost-Lancastrian incorporates the modified fuel system of the Nene-Lancastrian used for similar purposes by Rolls-Royce, Ltd. The first flight of the Ghost-Lancastrian was made on July 31st, since when the aircraft has been operated for over thirty hours by the de Havilland Engine Company. The Ghosts at present installed each deliver 4,500 lb thrust.

Construction	Metal
Power plant	Two Rolls-Royce Merlin and two D.H. Ghost
Span	102ft
Length	76ft 10in
Speed	Four engines : 330 m.p.h. at 20,000ft. Two Ghosts: (Merlins feathered) 275 m.p.h. at 10,000ft



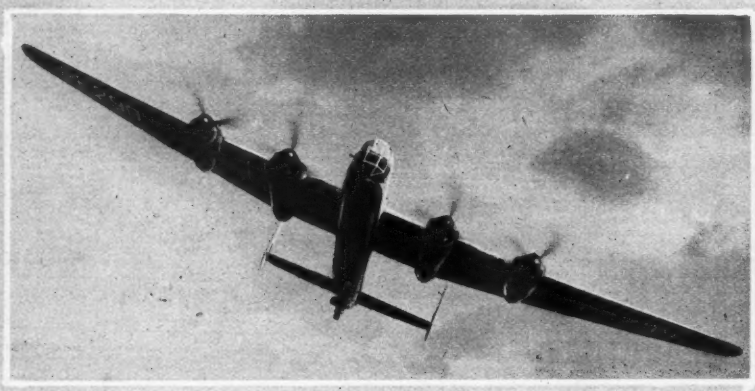
MILITARY AIRCRAFT

New and Established Types for Radlett

At least six new types of military aircraft—the Westland Wyvern and Blackburn S.28/43 naval strike machines, the Saro S.R./A1 flying-boat fighter, the Heston A.O.P., and the Boulton-Paul P.108 and Avro Athena advanced trainers, seem likely to be demonstrated this year at Radlett. Various developments of older designs, e.g., the Vickers Valetta, will be represented. At least two other new types of advanced design and sensational performance, which at one time it was hoped might be present, are unlikely to be released in time. Even so, the designs which re-appear—some of them considerably improved since last year—make a splendid showing. Together with other current types of military aircraft they are described and illustrated on these pages.

Since last year's display Great Britain has lost to America the speed record of 616 m.p.h. established by a Gloster Meteor IV. The record was secured in the first instance by a drastically modified Lockheed Shooting Star fighter, and has since been raised to 650 m.p.h. by a Douglas Skystreak research aircraft. This loss, in view of Britain's indisputable lead in jet propulsion technique, is a regrettable setback to our prestige but its technical significance must not be overrated. Radlett will serve as a reminder that in the Meteor IV we have the fastest standard fighter in the world. The Vampire, while of lower performance, possesses unique qualities which will long maintain it in the front rank of military aircraft, and the Attacker, already capable of 590 m.p.h. will be developed for yet greater speeds.

Contractions: I.R.C.= initial rate of climb. R.O.C.= rate of climb.



Avro Lincoln

NOW the standard heavy bomber of the Royal Air Force, the Lincoln B Mk. II carries the same bomb-load as its predecessor, the Lancaster, for a longer range and with a greater measure of protection. With 3,000 lb of bombs a range of 4,450 miles is attainable.

Function	Bombing
Construction	Metal
Power Plant	Two Rolls-Royce Merlin 68A
No. of crew	7-8
Span	120ft
Length	78ft 9in
Gross wing area ...	1,421 sq ft
Normal gross weight ...	82,000 lb
Normal wing loading ...	57 lb/sq ft
Maximum speed ...	Over 300 m.p.h.
Climb	15,000ft in 22 min
Range with typical load...	2,800 miles
Service ceiling	35,000ft
Typical armament ...	4 x 0.5in, plus 2 x 20 mm guns

Avro York

THE York C. Mk. I is a capacious aircraft with qualities which suit it for military transport. It is extensively used by Royal Air Force Transport Command, which also operates Avro Lancastrians. These are somewhat faster, but much less capacious, adaptations of the Lancaster bomber. To expedite production the York was designed to use major components of the Lancaster. The wings, power plants, undercarriage and main tail unit are identical.

Function	Transport
Construction	Metal
Power plant	Four Rolls-Royce Merlin 24
No. of crew	4-5
Span	102ft
Length	78ft 6in
Gross wing area ...	1,297 sq ft
Normal gross weight ...	68,000-71,000 lb
Normal wing loading ...	54.8 lb/sq ft
Maximum speed ...	306 m.p.h. at 10,800ft
Climb	I.R.C. 830 ft/min
Range with typical load...	2,600 miles
Service ceiling	26,000ft

Avro Athena

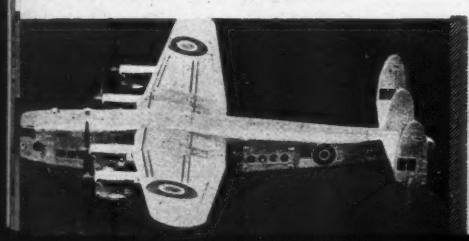
PRECEDED by a line of successful training aircraft which originated as long ago as 1914 in the Avro 504, the Athena T. Mk. I, now being developed by A. V. Roe and Co., Ltd., of Manchester, is a three-seater of very advanced design, intended to be powered either by an Armstrong-Siddeley Mamba or a Rolls-Royce Dart airscrew turbine unit. The prototype will have a Mercury or Merlin piston engine. A notable point of the design is the extremely good field of vision from the cockpit. Side-by-side seating is provided for the instructor and one pupil, and a rear seat for a second pupil.

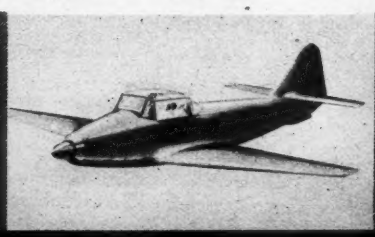
Functions	Training (several forms)
Construction	Metal
Power plant	Armstrong - Siddeley Mamba or Rolls-Royce Dart
No. of crew	Three
Span	40ft
Length	37ft 10in

Auster Mark VI

ARTILLERY observation and liaison aircraft, made by Auster Aircraft, Ltd., Rearsby, Leicester, are used not only by the British Army but by the Canadian, Dutch, Belgian and Greek Armies. The Mark VI is an advance on the wartime types and has a greater range and carrying capacity. A strengthened fuselage has permitted an increase in all-up weight and specially developed aerofoil flaps have been fitted behind the trailing edge.

Functions	Army reconnaissance. Liaison
Construction	Composite
Power plant	D.H. Gipsy Major VII
No. of crew	Two
Span	36ft
Length	23ft 9in
Gross wing area ...	184.5 sq ft
Normal gross weight ...	2,160 lb
Normal wing loading ...	11.75 lb/sq ft
Maximum speed ...	123 m.p.h. at 1,000ft
Climb	810ft/min
Service ceiling	14,000ft





Blackburn Firebrand

THE standard single-seat deck-landing strike aircraft used by British Naval Aviation, the Firebrand V is built by Blackburn Aircraft, Ltd., of Brough, East Yorkshire. Air brakes are fitted to the wings for use in dive bombing. After its torpedo, bombs or R.P.s have been released the Firebrand is capable of operating as a fighter.

Functions	Torpedo attack. Dive bombing. Fighting
Construction	Metal
Power plant	One Bristol Centaurus IX
No. of crew	One
Span	51ft 4in
Length	38ft 11in.
Gross wing area ...	381.5 sq ft
Normal gross weight ...	15,670 lb
Normal wing loading ...	41 lb/sq ft
Maximum speed ...	342 m.p.h. at 12,500ft
Climb	Initial R.O.C. 2,500ft/min
Range with typical load...	460 miles
Service ceiling	29,000ft
Typical armament ...	4 x 20 mm guns, 1 x 1,850 lb torpedo or 1 x 2,000 lb bomb or 16 x 60 R.P.

Blackburn S.28/43

DESIGNED specifically as a deck-landing dive-bomber and torpedo aircraft, the S.28/43, alternatively known as the Firecrest or by its S.B.A.C. designation Y.A.I., differs widely from the Firebrand, its predecessor. The pilot's field of view for deck landing and attack is exceptionally good for a single-engined aircraft. For folding two breaks are made in each wing panel.

Functions	Dive bombing. Torpedo attack
Construction	Metal
Power plant	Bristol Centaurus 59
No. of crew	One
Span	44ft 11¼ in
Length	39ft 3¾in
Gross wing area ...	361.5 sq ft
Normal gross weight ...	15,280 lb
Normal wing loading ...	42.3 lb/sq ft
Maximum speed ...	Performance data not available at time of going to press. Appreciably better than for the Firebrand
Climb	
Range with typical load...	
Service ceiling	

Boulton-Paul Balliol

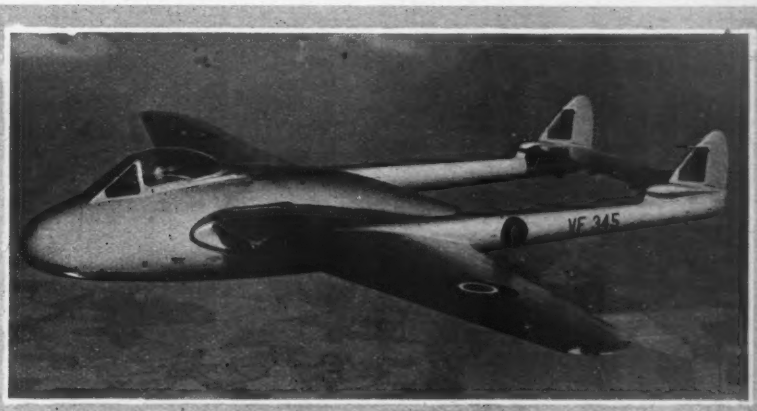
A NEW advanced training aircraft, the Balliol T. Mk. I, was designed by Boulton-Paul Aircraft, Ltd., of Wolverhampton, specifically to take an air-screw-turbine power unit, though initial flight trials have been made with a Bristol Mercury piston engine. A Rolls-Royce Merlin is an alternative engine. The type is readily adaptable for deck landing. Performance figures for the Balliol T.1 are not available. The photograph shows the P.108 prototype with Mercury engine. In this form it will fly at Radlett.

Functions	Training (several forms). Glider towing
Construction	Metal
Power plant	Armstrong-Siddeley Mamba or Rolls-Royce Dart
No. of crew	Three
Span	39ft 4in
Length	34ft 4in
Typical armament ...	Machine guns for practice

De Havilland Vampire and Sea Vampire

THE standard single-jet fighter of the R.A.F., the Vampire has already been exported in quantity. Various marks have been produced, the following data applying to the Mk. III, which has the latest type of tail unit, with low-set tailplane. Sea Vampires are in production for the Royal Navy.

Function	Fighting
Construction	Composite
Power plant	De Havilland Goblin II
No. of crew	One
Span	40ft
Normal gross weight ...	12,170 lb
Normal wing loading ...	45.8lb/sq ft
Maximum speed ...	531 m.p.h.
Climb	I.R.C., 4,350ft/min
Range with typical load...	1,145 miles
Typical armament ...	4 x 20 mm guns. 2 x 500 lb bomb or 8 R.P.



Bristol Brigand

NOW going into service with the R.A.F. as a replacement for the Beaufighter, the Brigand T.F. Mk. I, to which the following particulars apply, combines great striking power with long range and a high performance. It can be used for dive bombing and has air brakes for the purpose. The Bristol works are at Filton, Bristol.

Functions	Torpedo attack. Dive bombing. Fighting
Construction	Metal
Power plant	Two Bristol Centaurus 57
No. of crew	Two
Span	72ft 4in
Length	46ft 5in
Gross wing area ...	718 sq ft
Normal gross weight ...	39,000 lb
Normal wing loading ...	54lb/sq ft
Maximum speed ...	345 m.p.h. at 14,000ft
Climb	I.R.C. 1,490ft/min
Range with typical load...	2,080 miles
Service ceiling	26,000ft
Typical armament ...	4 x 20 mm guns. 1 x 1,850 lb torpedo or 2 x 1,000 lb + 2 x 600 lb bombs, or 16 x 60 lb R.P.

Bristol Buckmaster

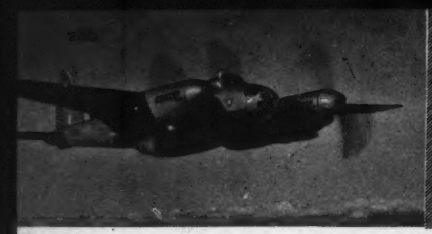
USED in the Royal Air Force for advanced training, the Buckmaster T. Mk. I reproduces certain of the characteristics of the Brigand although the fuselage is of totally different design. It is probably the most powerful trainer in the world. The crew of three is composed of an instructor, pupil-pilot and radio operator. Not only the flying controls, but the controls for undercarriage, flaps, airscrews and throttles are duplicated. Full equipment for night flying and blind flying is installed.

Function	Training
Construction	Metal
Power plant	Two Bristol Centaurus VII
No. of crew	Two
Span	71ft 10in
Length	46ft 5in
Gross wing area ...	708 sq ft
Normal gross weight ...	33,700 lb
Normal wing loading ...	45lb/sq ft
Maximum speed ...	352 m.p.h. at 12,000ft
Climb	I.R.C. 2,245ft/min
Service ceiling	30,000ft

De Havilland Hornet and Sea Hornet

IN addition to the Hornet I fighter, as used by the R.A.F., the de Havilland Aircraft Co., Ltd., of Hatfield, have produced the Mk. II photographic reconnaissance machine, the Mk. III long-range escort fighter, the Mk. XX single-seat Naval fighter (illustrated) and the Mk. 21 two-seat Naval night fighter. The Sea Hornet 21 carries a navigator/radar operator. The data below apply to the Hornet F. Mk. III.

Functions	Fighting. Bombing. Attack
Construction	Composite
Power plant	Two Rolls-Royce Merlin 130/131
No. of crew	One
Span	45ft
Gross wing area ...	361 sq ft
Normal gross weight ...	21,060 lb
Maximum speed ...	472 m.p.h. at 22,000ft
Climb	I.R.C. 4,650ft/min
Range with max tankage	2,600 miles
Service ceiling	37,500ft
Typical armament ...	4 x 20 mm guns



De Havilland Mosquito and Sea Mosquito

THE most versatile twin-engined military aircraft yet produced, the Mosquito is serving with ten of the world's air forces, and the deck-landing version (Sea Mosquito) is in service with British Naval Aviation. The latest marks are the N.F. Mk. 38 night fighter and the T.T. Mk. 39 target tower. The following data apply to the Mosquito with the highest performance—the P.R. Mk. 34 photographic reconnaissance machine.

Function	Reconnaissance
Construction	Wooden
Power plant	Two Rolls-Royce Merlin 113/114
No. of crew	Two
Span	54ft 2in
Length	41ft 2in
Normal gross weight ...	25,500 lb
Normal wing loading ...	57lb/sq ft
Maximum speed ...	422 m.p.h. at 30,000ft
Range with typical load...	3,500 miles
Service ceiling	37,000ft

Fairey Firefly

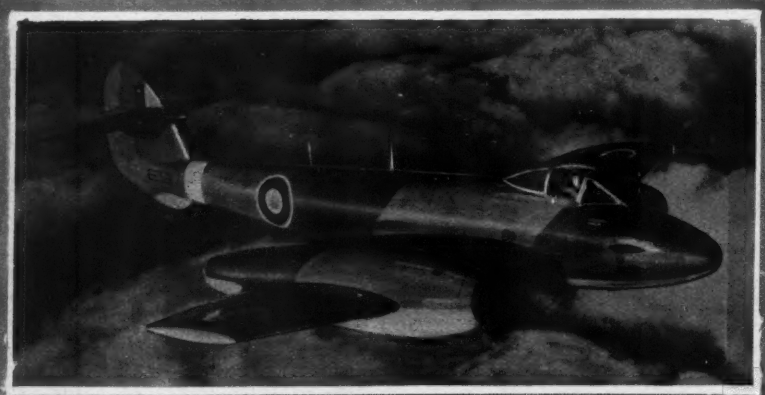
FIREFLY F.R. Mk. IV aircraft are being delivered by the Fairey Aviation Co., Ltd., of Hayes, Middlesex, not only to the Royal Navy but to the Royal Canadian Navy and the Netherlands Government. This version is supplementing and gradually replacing the Firefly I. Performance quoted is for the stripped condition, i.e., without wing nacelles.

Functions	Fighting Reconnaissance. Bombing. Attack
Construction	Metal
Power plant	Rolls-Royce Griffon 74
No. of crew	Two
Span	41ft 2in
Length	38ft
Gross wing area... ...	330 sq ft
Normal gross weight ...	13,200 lb
Normal wing loading ...	40 lb/sq ft
Maximum speed ...	386 m.p.h. at 14,000ft
Climb	15,000ft in 9.6 min
Range with typical load...	760 miles
Service ceiling	31,900ft
Typical armament ...	4 x 20 mm. guns. 2 x 1,000lb bombs, or 16 x 60lb R/Ps.

Fairey Spearfish

ONE of the most versatile of single-engined military aircraft, the Spearfish T.D. Mk. I torpedo bomber is among the largest deck-landing machines developed to date. Dive brakes are fitted. The folded width is only 19ft 6in. The dorsal guns are mounted in a remotely controlled Frazer-Nash turret.

Functions	Torpedo attack. Dive bombing
Construction	Metal
Power plant	Bristol Centaurus
No. of crew	Two
Span	60ft 3in
Length	44ft 7in
Gross wing area ...	647 sq ft
Normal gross weight ...	22,000 lb
Normal wing loadings ...	41.5lb/sq ft
Maximum speed ...	292 m.p.h. at 14,000ft
Climb	10,000ft in 7.7 min
Range with typical load...	Over 1,000 miles
Service ceiling	25,000ft
Typical armament ...	4 x 0.5 in guns. 1 x 1,850 lb torpedo, or 1 x 2,000 lb bomb, or 4 x 500 lb bombs



Gloster Meteor

NOW replacing the Meteor III as the standard twin-jet fighter of the Royal Air Force, the Mark IV Meteor is a product of the Gloster Aircraft Co., Ltd., of Hucclecote, Gloucestershire. The Meteor VII is a dual-control trainer with a similar performance.

Functions	Fighting. Reconnaissance. Bombing. Attack
Construction	Metal
Power Plant	Two Rolls-Royce Derwent V
No. of crew	One
Span	37ft 2in
Length	41ft
Normal gross weight ...	14,400 lb
Maximum speed ...	580 m.p.h. at 15,000ft
Climb	30,000ft in 5.1 min
Range with typical load...	360 miles
Typical armament ...	4 x 20 mm. guns. Provision for 2 x 1,000 lb bombs or R.P. load

Fairey Operational Trainer

A SPECIALIZED trainer development of the well-tried Firefly I naval fighter reconnaissance aircraft this machine is particularly useful for familiarising prospective pilots of single-engined high-powered military aircraft with flying characteristics common to this class (e.g., tendency to swing on take-off). The rear cockpit, occupied by the instructor, is 12 inches above the level of the pupil's cockpit. The Firefly IV could be similarly adapted for training.

Functions	Training (several types)
Construction	Metal
Power plant	Rolls-Royce Griffon XII
No. of crew	Two
Span	44ft 6in
Length	37ft 7in
Gross wing area ...	328 sq ft
Normal gross weight ...	12,000lb
Normal wing loading ...	36 lb/sq ft
Maximum speed ...	305 m.p.h. at 16,000ft
Climb	10,000ft in 5.5 min
Range with typical load...	800 miles
Service ceiling	28,000ft
Typical armament ...	2 x 20 mm. guns

Handley Page Hastings

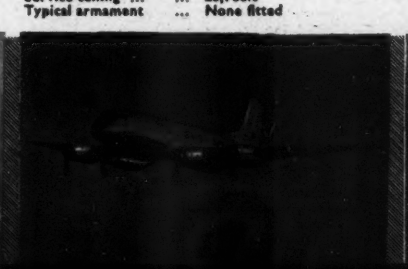
NOW in quantity production for transport squadrons of the Royal Air Force at the Cricklewood works of Handley Page, Ltd., the Hastings C. Mk. 1 differs from the later marks of Hermes civil transports in having a shorter fuselage and tailwheel undercarriage. Its roles will include those of freighter, paratrooper, ambulance, troop transport and glider tug. Military equipment such as jeeps, field guns and 15 cwt trucks can be carried internally.

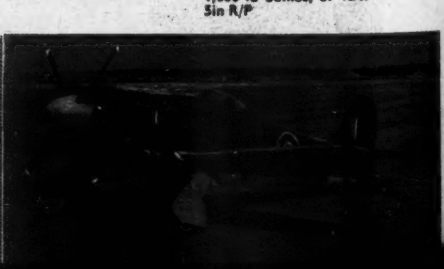
Functions	Transport. Glider towing
Construction	Metal
Power plant	Four Bristol Hercules 101
No. of crew	Five
Span	113ft
Length	81ft 8in
Gross wing area ...	1,408 sq ft
Normal gross weight ...	75,000 lb
Normal wing loading ...	53 lb/sq ft
Maximum speed ...	354 m.p.h. at 23,700ft
Climb	I.R.C. 1,110ft/min
Range with typical load...	2,000 miles
Service ceiling	26,700ft
Typical armament ...	None fitted

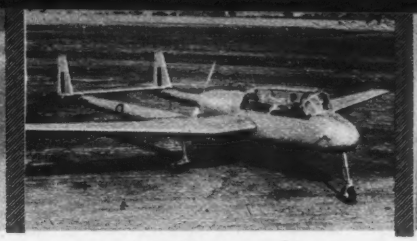
Hawker Sea Fury

THE Hawker Sea Fury F. Mk. X has been adopted by British Naval Aviation, the Royal Canadian Navy and the Netherlands Government. It is a highly versatile and extremely manœuvrable deck-landing aircraft. Structurally it resembles the Fury. With the Centaurus XVIII engine operating at 14 lb boost the top speed is 460 m.p.h.

Functions	Fighting. Bombing. Attack. Reconnaissance
Construction	Metal
Power Plant	Bristol Centaurus XVIII
No. of crew	One
Span	38ft 5in
Length	34ft 7in
Gross wing area ...	280 sq ft
Normal gross weight ...	12,030 lb
Normal wing loading ...	43 lb/sq ft
Maximum speed ...	453 m.p.h. at 20,500ft
Climb	7,000ft in 4.3 min
Range with typical load	Max. range with drop tanks is 2,080 miles
Service ceiling ...	Over 40,000ft
Typical armament ...	4 x 20 mm. guns. 2 x 1,000 lb bombs, or 12 x 5in R/P







Hawker Fury

THE Fury single-seat fighter has been produced both with the Napier Sabre VII (NS93/SM) 24-cylinder liquid-cooled engine and with the Bristol Centaurus XV two-row radial. Like the Sea Fury it is an extremely versatile aircraft but has a much higher performance than its predecessor, the Tempest. A two-seat trainer version is being developed for the Royal Iraqi Air Force.

Functions	Fighting. Bombing. Attack
Construction	Metal
Power plant	Napier Sabre VII
No. of crew	One
Span	38ft 5in
Length	34ft 8in
Gross wing area	284.5 sq ft
Normal gross weight	12,120lb
Normal wing loading	42.6lb/sq ft
Maximum speed	483 m.p.h. at 18,500ft
Climb	24,000ft in 6 min
Range with auxiliary tanks	1,480 miles
Typical armament	2 x 20 mm guns, 2 x 1,000lb bombs, or 8 x 5in. R/P

Heston A.O.P.

A TOTALLY new observation and liaison aircraft built to the order of the Ministry of Supply by the Heston Aircraft Co., Ltd., of Heston, Middlesex, this machine features twin booms and a pusher propeller. The occupants have an exceptionally wide field of vision. Design requirements were robustness, easy maintenance, and the ability to fly slowly and to operate from small fields. Slotted flaps and full-span leading-edge slats are fitted. The outer sections of the slats are fully automatic, but the remaining sections are extended fully when the flaps are moved to take-off or landing position.

Functions	Observation. Liaison
Power plant	D.H. Gipsy Queen 33
Span	44ft
Length	34ft
Gross wing area	274 sq ft
Normal gross weight	3,050 lb
Normal wing loading	11lb/sq ft

Percival Prentice

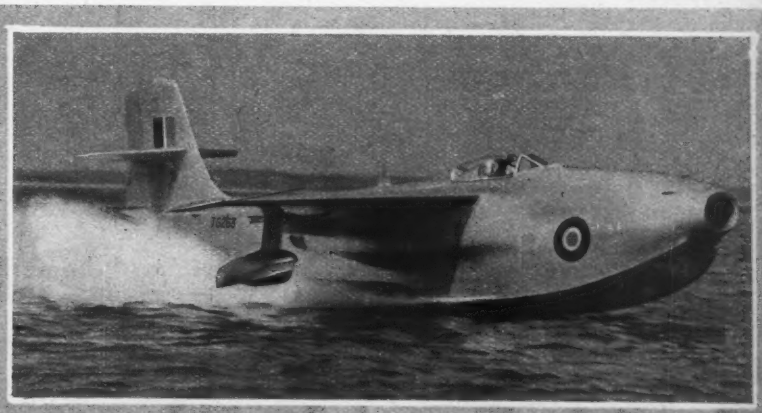
THE Prentice T. Mk. I is now in quantity production as a standard training aircraft of the R.A.F. Designed to Air Ministry specification T.23/43, by Percival Aircraft, Ltd., of Luton, Beds, it is fully aerobatic. The instructor and a pupil sit side by side and there is a place for a second pupil behind them on the centre line. As an alternative to the normal Gipsy Queen 32 engine, the Gipsy Queen 51 supercharged unit may be installed.

Functions	Training (several forms)
Construction	Metal
Power plant	D.H. Gipsy Queen 32
No. of crew	2-3
Span	46ft
Length	31ft 3in
Gross wing area	305 sq ft
Normal gross weight	3,850 lb
Normal wing loading	12.6lb/sq ft
Maximum speed	155 m.p.h. at sea level
Climb	5,000ft. in 6.5 min
Service ceiling	18,000ft

Saunders-Roe S.R/A1

THE first jet-propelled flying-boat in the world, the S.R./A1 fighter, latest product of Saunders-Roe, Ltd., of Cowes, I.o.W., is now undergoing flight trials. It is designed for operation from sheltered stretches of water, which demand much less preparation than emergency landing "strips." Range can be extended by carrying drop tanks beneath the wings.

Function	Fighting
Construction	Metal
Power plant	Two Metropolitan-Vickers Beryl
No. of crew	One
Span	46ft
Length	50ft
Gross wing area	415 sq ft
Maximum speed	Probably over 500 m.p.h. after development
Typical armament	4 x 20 mm guns



Reid and Sigrist Desford

A UNIQUE twin-engined tandem-seater trainer, the Desford, built by Reid and Sigrist, Ltd., of Walton Lodge, Leicestershire, is fully aerobatic. It was found that on the Snargasher, from which the Desford was developed, pupils were able to go solo in from eight to fourteen hours, and it was shown that no additional time was necessary to accustom them to handling larger twin-engined aircraft. Gipsy Major Series 10 or 30 engines are optional to meet particular requirements.

Functions	Training (various forms)
Construction	Wood
Power plant	Two D.H. Gipsy Major Series 1
No. of crew	Two
Span	34ft
Length	25ft 6in
Gross wing area	186 sq ft
Normal gross weight	3,300lb
Normal wing loading	18lb/sq ft
Maximum speed	162 m.p.h. at sea level
Climb	1,100fc/min
Service ceiling	17,700ft

Short Seaford

MILITARY counterpart of the Solent, the Seaford, built by Short Bros., of Rochester, is a Sunderland development of increased all-up weight and having a superior performance and heavier armament. The hull has been re-designed in accordance with the increased weight. The data following relate to the Seaford Mk. I as used by the Royal Air Force.

Functions	Reconnaissance. Bombing
Construction	Metal
Power plant	Four Bristol Hercules XIX
No. of crew	Eleven
Span	112ft 9in
Length	80ft 6in
Gross wing area	1,487 sq ft
Normal gross weight	78,000 lb
Normal wing loading	52lb sq ft
Maximum speed	240 m.p.h.
Climb	I.R.C. 875ft/min
Range	Max. overload range about 3,000 miles
Typical armament	2 x 0.303in + 6 x 0.5in + 2 x 20 mm guns. Various bomb or depth-charge loads

Short Sturgeon

DESIGNED as a carrier-borne reconnaissance bomber, the Sturgeon Mk. I, which completed its first deck-landing trials this year, is now being developed as a high-speed target tower for Naval use. The folded width is only 20ft. In the target-tower version, which has full deck-landing equipment, the target drogues are stowed in the bottom of the fuselage and are operated by a power-driven winch.

Functions	Reconnaissance. Bombing.
Construction	Metal.
Power plant	Two Rolls-Royce Merlin 140
No. of crew	Two
Span	59ft 11in
Length	44ft 10in
Gross wing area	560 sq ft
Normal gross weight	21,700 lb
Normal wing loading	38.7lb/sq ft
Maximum speed	402 m.p.h. at 19,000ft
Climb	I.R.C. 4,000ft/min
Service ceiling	35,700ft
Typical armament	2 x 0.5in guns. 1 x 1,000 lb or 2 x 500lb bombs

Vickers-Armstrongs Valetta

NEWEST R.A.F. transport, the Vickers Valetta, is similar to the civil Viking IB. In addition to its primary purposes it can be used as a tug for gliders up to 17,000 lb total weight, for supply dropping or for evacuation of casualties. There is a large main double door.

Functions	Troop and paratroop transport. Freight and vehicle carrier
Construction	Metal
Power plant	Two Bristol Hercules 230
No. of crew	Four
Span	89ft 3in
Length	65ft 2in
Gross wing area ...	882 sq ft
Normal gross weight ...	36,000 lb
Normal wing loading ...	40.9 lb/sq in
Maximum speed ...	255 kt
Climb	10,000ft in 8 min
Range with typical load...	Freighter : 1,380 naut. miles at 150 kt
	Paratrooper : 375 naut. miles at 183 kt
Service ceiling	21,500ft

Vickers-Armstrongs (Supermarine) Seafire

LATEST development of the Seafire series, the F. Mk. 47 is now in service with British Naval Aviation. It is a direct development of the Spitfire 22. A variant, F.R. Mk. 47, is equipped for fighter-reconnaissance duties.

Functions	Fighting. Bombing. Attack
Construction	Metal
Power plant	One Rolls-Royce Griffon R.G.4SM
No. of crew	One
Span	36ft 11in
Length	34ft 4in
Gross wing area ...	244 sq ft
Normal gross weight ...	10,200 lb
Normal wing loading ...	41.9 lb/sq ft
Maximum speed ...	452 m.p.h. at 20,500ft
Climb	R.O.C. at 2,000ft, 4,790 ft/min
Range with typical load...	575 miles (with combat tanks)
Service ceiling	43,000ft
Typical armament ...	4 x 20 mm guns. Provision for 3 x 500 lb bombs or R.P. load

Vickers-Armstrongs (Supermarine) Spitfire

THE latest Spitfires are still among the fastest piston-engined fighters in the world, by virtue of their refined aerodynamic design and the use of the Griffon engine. Last year a two-seat trainer version was turned out from the Supermarine works at Hursley Park, Hants. The following data apply to the Mk. 24.

Functions	Fighting. Bombing. Attack
Construction	Metal
Power plant	Rolls-Royce Griffon 64 or 85
No. of crew	One
Span	36ft 11in
Length	32ft 11in
Normal gross weight ...	9,900 lb
Normal wing loading ...	40.5 lb/sq ft
Maximum speed ...	450 m.p.h. at 19,600ft
Climb	R.O.C. at 2,000ft, 4,900 ft/min
Range with typical load...	580 miles
Service ceiling	43,000ft
Typical armament ...	4 x 20 mm, 3 x 500 lb bombs, or various R.P. loads

Westland Wyvern

THE first mark of this new naval strike aircraft (T.F.1), built by Westland Aircraft, Ltd., of Yeovil, Somerset, is powered with the equally new Rolls-Royce Eagle 24-cylinder flat-H piston engine. This contributes to the unusually good field of view from the cockpit.

Functions	Torpedo attack. Bombing. Fighting
Construction	Metal
Power plant	Rolls-Royce Eagle
No. of crew	One
Span	44ft
Length	40ft
Normal gross weight ...	22,000 lb
Maximum speed ...	455 m.p.h.
Endurance	3½ hr
Typical armament ...	4 x 20 mm guns, 1 x 20in torpedo, 1 x 2,000 lb bomb, or 8 x 60lb R.P.

Vickers-Armstrongs (Supermarine) Spiteful and Seafang

THESE two types are basically similar, but the Seafang is a deck-landing aircraft with power-folding outer wings and full Naval equipment. Both types represent a great advance in aerodynamic design over the Spitfire and Seafire series, and with the latest mark of Rolls-Royce Griffon the Spiteful is the fastest airscrew-driven fighter in the country. Performance figures for the Spiteful XVI are quoted.

Functions	Fighting. Bombing. Attack
Construction	Metal
Power plant	Rolls-Royce Griffon
No. of crew	One
Span	35ft
Normal gross weight ...	10,450 lb
Normal wing loading ...	49.8lb/sq ft
Maximum speed ...	494 m.p.h. at 28,500ft
Climb	Max. R.O.C., 4,750 ft/min
Service ceiling	43,000ft
Typical armament ...	4×20 mm guns. Bombs or R.P.s

Vickers-Armstrongs (Supermarine) Attacker

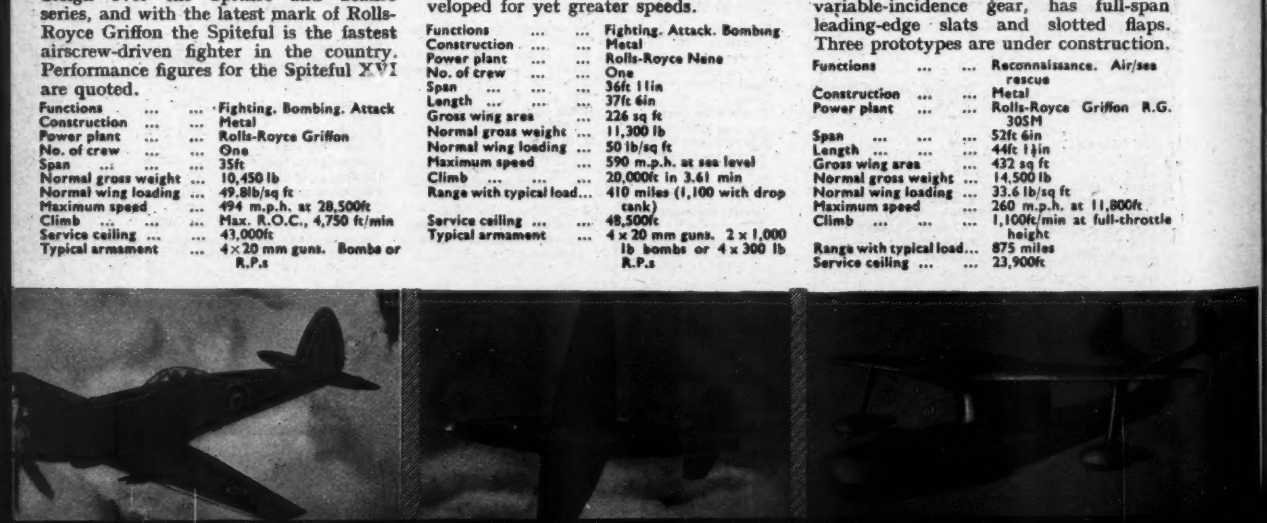
A SINGLE-JET fighter of exceptional performance, the Attacker has been developed both as a normal land-based machine and with fittings for operation from aircraft carriers. Three prototypes, two equipped for deck-landing, have been built. The type will doubtless be developed for yet greater speeds.

Functions	Fighting. Attack. Bombing
Construction	Metal
Power plant	Rolls-Royce Nene
No. of crew	One
Span	36ft 11in
Length	37ft 6in
Gross wing area ...	226 sq ft
Normal gross weight ...	11,300 lb
Normal wing loading ...	50 lb/sq ft
Maximum speed ...	590 m.p.h. at sea level
Climb	20,000ft in 3.61 min
Range with typical load...	410 miles (1,100 with drop tank)
Service ceiling	48,500ft
Typical armament ...	4 x 20 mm guns. 2 x 1,000 lb bombs or 4 x 300 lb R.P.s

Vickers-Armstrongs (Supermarine) Seagull

A HIGH-PERFORMANCE amphibian flying boat, the Seagull is unique in having a variable-incidence wing derived from that of the Supermarine Type 322 landplane. This is designed to fold (the Seagull is fully equipped for carrier operation) and in conjunction with its variable-incidence gear, has full-span leading-edge slats and slotted flaps. Three prototypes are under construction.

Functions	Reconnaissance. Air/sea rescue
Construction	Metal
Power plant	Rolls-Royce Griffon R.G. 30SM
Span	52ft 6in
Length	44ft 1½in
Gross wing area ...	432 sq ft
Normal gross weight ...	14,500 lb
Normal wing loading ...	33.6 lb/sq ft
Maximum speed ...	260 m.p.h. at 11,800ft
Climb	1,100ft/min at full-throttle height
Range with typical load...	875 miles
Service ceiling	23,900ft



ROTATING-WING AIRCRAFT

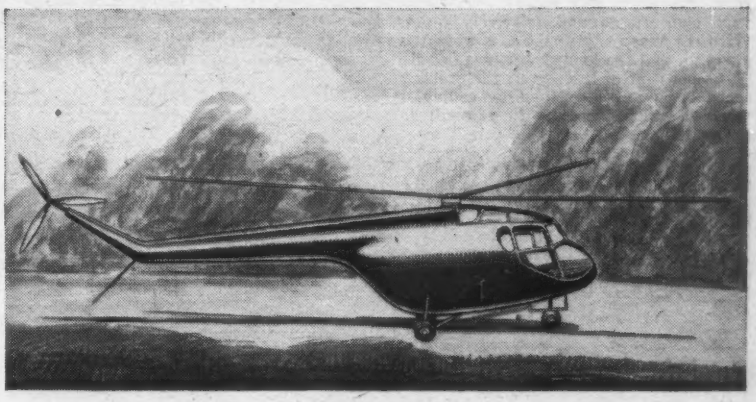
Variety of British Types in Course of Development

ALTHOUGH only two helicopters of British design and construction are to be seen at Radlett (Fairey and Cierva), it should not be concluded that helicopter development is neglected. In point of fact, three British firms are engaged on helicopter production: The Bristol Aeroplane Co., Ltd., the Cierva Autogiro Co., Ltd., and the Fairey Aviation Co., Ltd. Of these three, Bristols have had flights with their helicopter, the Cierva "Air Horse" is in the design stage and construction of components has started, while the Fairey Gyrodyne is all but ready for flight. The Sikorsky S.51 is being built by Westlands.

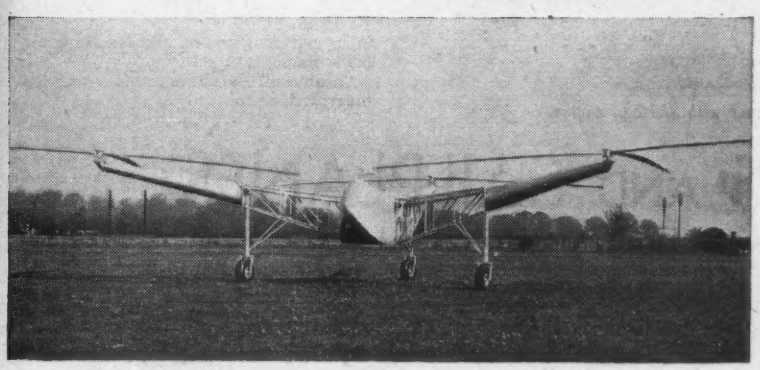
Bristol Helicopter

DESIGNED by Mr. R. Hafner, the Bristol helicopter belongs generically to the class made classic by Igor Sikorsky: a single main rotor, with a tail rotor for torque-reaction. There, however, the similarity ends. The rotor blades are mounted on flexible tie-rods, and pitch control is by means of a "spider." This form of blade suspension gives very light control forces since pitch-change mechanical friction is reduced to a minimum.

Although the Bristol 171 has flown, the makers are unwilling to release detailed data at present. The engine used in the prototype is a Wasp Junior, but production models will be fitted with the Alvis Leonides. The machine is designed for pilot and three passengers, and the fuselage is as carefully streamlined as is possible.



The Bristol 171 four-seater helicopter. An artist's impression.



The original Cierva "Air Horse" is here represented by a full-scale mock-up.

Cierva Helicopters

IN addition to the W.9 research helicopter on show at Radlett, the Cierva Autogiro Co., Ltd., exhibits two scale models, one of the W.11 and the other of the W.12. The W.11 is a development of the original W.10 "Air Horse," and will be the world's largest helicopter. It incorporates the three-rotor arrangement of the W.10 and has a designed useful load of four tons.

The W.12 retains the three-rotor arrangement, but is a smaller machine with a useful load of about 1½ tons. Two versions are planned, one for 12 passengers and the other a freight-carrier. They will have two engines, so coupled together and to the three rotors that flight can be continued on one engine.

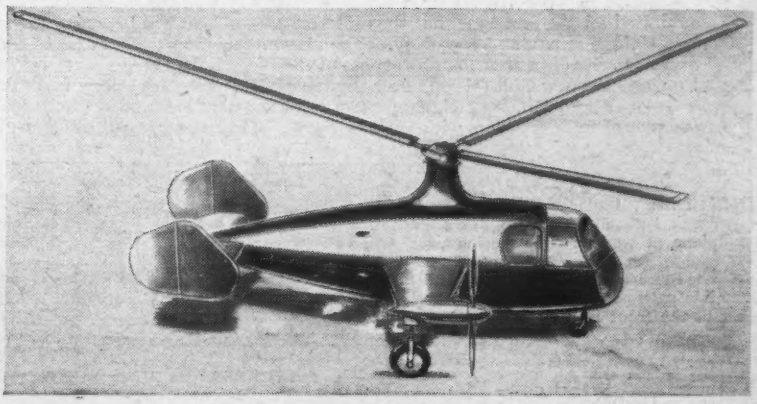
A feature is that long-travel undercarriage legs permit landing in autorotation.

Fairey Gyrodyne

PERHAPS the most unusual feature of this helicopter is that torque-reaction and directional control are obtained by an airscrew on one of the short stub wings. The thrust of this adds its quota to forward propulsion. Another advantage is that the main rotor blades are always working in the autorotative pitch range. By having the undercarriage on the ends of the stub wings, a very wide wheel track is provided.

The first experimental Gyrodyne is just ready for its first flight. The machine is a four-seater with Alvis Leonides engines. Design estimates for the finalized version are for a cruising speed of 100 m.p.h., a range of 230 miles and an absolute ceiling of 18,000 feet.

Other data are: Empty weight 3,270 lb; useful load 1,230lb. Rotor diameter 52ft; disc loading 2.1 lb/sq. ft.



The Fairey Gyrodyne uses an airscrew on a stub wing for torque-reaction.

Rotating-wing Aircraft . . . .

Westland-Sikorsky S.51

MENTION was made on the previous page of the fact that Westland Aircraft, Ltd., are to build the S.51 under licence in this country. The machine is a four-seater, and the original is powered by a Pratt and Whitney engine. The Westland version will have an Alvis Leonides of 500 h.p

The S.51 incorporates many refinements compared with earlier models, and from the passengers' point of view is very comfortable and relatively quiet. With the Wasp engine the tare weight is 3,735 lb, and the loaded weight 5,000 lb. At 65 per cent of the power, the cruising speed is 85 m.p.h. Hovering ceiling is 5,000ft, which increases to 14,000ft in forward flight.

The Westland-Sikorsky S.51 four-seater.

The Irvin-Bell 47B is a two-seater with 160 h.p. engine.

The Irvin-Bell 47B

APART from the fact that the Bell 47B, which is now handled in Great Britain by Irvin-Bell Helicopter Sales, Ltd., is a smaller machine than the others described (two-seater), it differs basically in its main rotor details. There are only two blades, and they are rigidly attached to the hub so that as one blade rises, the other descends. The plane of the rotor is maintained in space by a stabilizing bar.

The engine of the M47B is a Franklin of 160 h.p. and the machine has a loaded weight of 2,100 lb. The disposable load is 600 lb. Cruising speed is 80 m.p.h. on 75 per cent power. The main rotor has a diameter of 35ft.

An unusual feature is the four-wheeled undercarriage.

GLIDERS AND SAILPLANES

New Models at Radlett

AMONG the exhibits at the B.A.C. show at Radlett this year there is to be seen ample evidence of Britain's advancement in the field of glider design and construction.

The demand for British built gliders and sailplanes is rapidly increasing. During the last two years the A.T.C. alone have inaugurated eighty-four gliding schools throughout the country and many of the gliding clubs which were operating before the war have now reopened. The generosity of Lord Kemsley in providing a fund has done much to foster post-war interest in this fascinating aspect of aviation, and the achievements of British pilots at home and abroad have been most encouraging.

There are to be 10 different types of gliders in the B.A.C. show. Some of these are prototypes being exhibited for the first time, but the majority are, or soon will be, in quantity production.

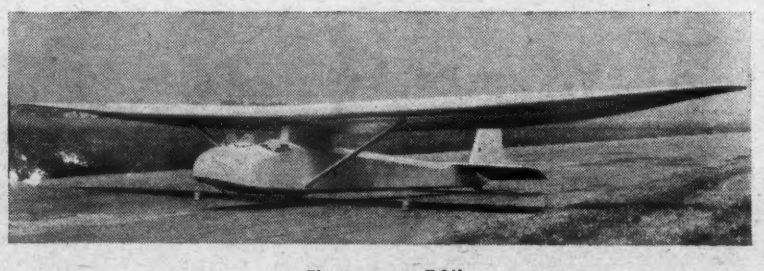
Unique in having a low-wing tandem layout, the Short Nimbus is to be demonstrated in flight. Elliots of Newbury will be showing prototypes of the Baby Eon, a single seat intermediate trainer, and the Primary Eon, and the new Gull IV will be among the Slingsby range of sailplanes in the display.

An entirely different class of glider built for aerodynamic research will also be represented. Three samples of tailless gliders with various degrees of sweep-back will be shown by General Aircraft Ltd.

Slingsby T.21b

THE T.21b., built by Slingsby Sailplanes, Ltd., is a high-wing, strutted monoplane of wooden construction with side-by-side seating. All controls are duplicated and lift spoilers provide effective glide path control. A landing wheel is aft of the front landing skid.

Span	54ft
Length	27ft
Weight empty	590 lb
Best gliding angle at 43 m.p.h.	21 : 1
Min. sinking speed at 38 m.p.h.	2.75 ft/sec
Stalling speed	32 m.p.h.



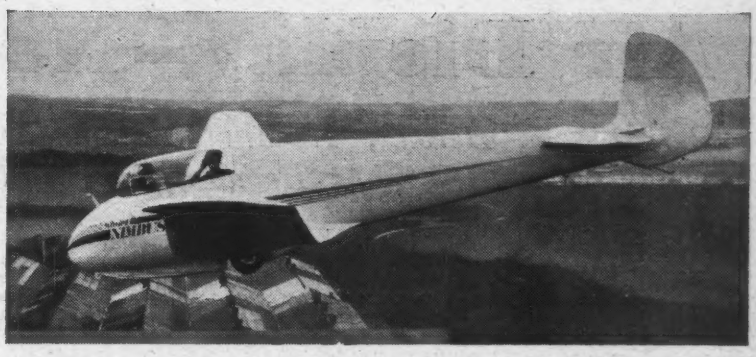
The two-seater T.21b.

Gliders and Sailplanes . . . .

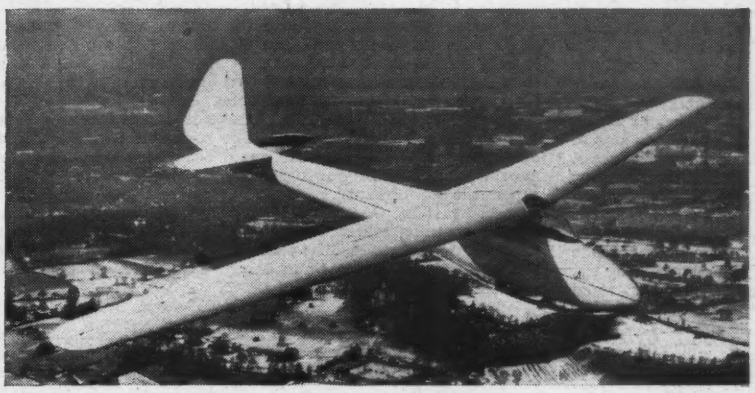
Short Nimbus

BUILT by Short Bros., at Rochester, the Nimbus is a low, gull-wing two-seater glider now in quantity production. Seating accommodation is arranged in tandem and both pilots have a wide field of vision. A landing wheel equipped with a brake is fitted and other important features are dual controls, longitudinal trimming and dive brakes.

Span	62ft
Length	26ft 10in
Weight empty	800 lb
Best gliding angle at 37 m.p.h.	25 : 1
Min. sinking speed ...	2.3 ft/sec
Stalling speed	35 m.p.h.
Accommodation ...	Two (in tandem)



The tandem-seat Short Nimbus.



The Olympia Eon on tow.

Olympia Eon

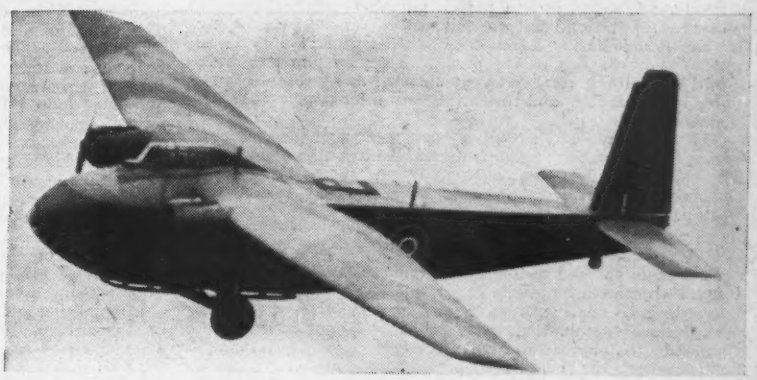
WHEN the 1940 Olympic Games were being planned it was decided to include soaring among the competitive sports. Eight countries submitted designs for a standard glider to be used in this event and from these the Olympia was chosen. Post-war production of the Olympia has been taken over by Elliot's of Newbury. It is fully aerobatic, has dive brakes, adjustable rubber pedals and tab trimmers. The production model is all timber and plywood construction and is fitted with a built-in landing wheel.

Span	49.25ft
Length	23.83ft
Weight empty	420 lb
Best gliding angle at 46 m.p.h.	25 : 1
Min. sinking speed at 39 m.p.h.	2.2 ft/sec
Stalling speed	32 m.p.h.
Accommodation ...	One

Hamilcar X

GENERAL AIRCRAFT, LTD., of Feltham, Middlesex, produced the Hamilcar X (two Bristol Mercury 31 engines) in 1944. It is a direct development of the Hamilcar glider which was used during the war in all the major Allied airborne landings. The square-sectioned fuselage is of semi-monocoque construction and comprises an unobstructed hold, designed to accommodate a large variety of heavy military freight. The aircraft is capable of solo flight up to a weight of 32,000 lb.

Construction	Wood
Span	110ft
Length	68ft
Weight empty	25,510 lb
Normal loaded weight ...	45,500 lb
Rate of descent in solo flight at full load ...	150 ft/min
Power plant	Two Bristol Mercury 31 engines



Hamilcar X.

Slingsby Gull IV

DESIGNED and built by Slingsby Sailplanes, Ltd., the Gull IV is designed for high-performance flying and is equipped with dive brakes and tailplane incidence trim. It is fully aerobatic and may be launched by winch or towed behind an aircraft. Wings are full cantilever. The Gull IV will be flown during the Radlett display.

Span	50ft
Length	24ft
Weight empty	435 lb
Gliding angle at 45 m.p.h.	26.5 : 1
Gliding angle at 60 m.p.h.	20 : 1
Min. sinking speed at 40 m.p.h.	2.4 ft/sec
Accommodation ...	One

Slingsby Kite II

THE Kite II was developed from the pre-war Kite I by Slingsby Sailplanes, Ltd. It has greater overall dimensions than the Mk. I and a completely new wing which provides good flying characteristics and a wide speed range. The Kite II is a single-seater fitted with a central landing wheel and dive brakes. Rudder pedals are adjustable.

Span	49ft 10½in
Length	23ft 8½in
Weight empty	419 lb
Best gliding angle at 44 m.p.h.	23.5 : 1
Min. sinking speed at 38 m.p.h.	2.55 ft/sec
Stalling speed	32 m.p.h.
Accommodation ...	One

Slingsby Cadet I

DESIGNED primarily as standard training machines, the Cadet I and II are sturdily constructed high-wing gliders which are being used extensively by the A.T.C. for *ab initio* and advanced instruction. A central wheel is fitted which absorbs most of the main landing shock and reduces the wear on the front skid. The Cadet is designed and built by Slingsby Sailplanes, Ltd., Kirbymoorside, Yorks.

Span	38ft 5in
Length	20ft 6in
Weight empty	328 lb
Best gliding angle ...	16 : 1
Min. sinking speed ...	2.8 ft/sec
Stalling speed	29 m.p.h.
Accommodation ...	One

Air Display—Navy Way

H.M.S. "Heron", Training Station for Air Mechanics, At Home to the West

NAVAL AIR DAY at Yeovilton was a surprise. This does not imply by any means that previous displays organized by the Navy have been such that something less than best was expected, but there is no doubt that the exceptionally large crowds who were present on Saturday, September 6th, were treated to one of the best, if not the best, exhibition and flying meeting of the year. For variety, organization and general interest it is unsurpassed.

Most of the prior publicity was confined to towns and cities in the West, but a clue to the importance of this Naval Air Day was given by the presence to open the proceedings of Admiral of the Fleet Sir James Somerville, G.C.B., G.B.E., D.S.O., Lord Lieutenant of the County of Somerset.

H.M.S. *Heron* (R.N.A.S. Yeovilton) is not primarily a Naval Aviation station, although there is one squadron stationed there, No. 700 Flight Testing Squadron, which also conducts a maintenance test pilots' course. The station is chiefly concerned with the training of Air Mechanics in one of the four branches Ordnance, Engines, Airframes, Electrical. Weekly entries of ratings who have had a short initial training course elsewhere are put through an intensive six-months' Air Mechanics course. Admiral Somerville, in his address at the opening ceremony, pointed out that Air Mechanics in the Navy had a very great responsibility in view of the long flights made over water in single-engined aircraft when a forced landing left only the slenderest chance of rescue. The excellent illustrated Souvenir Programme of the Naval Air Day makes it clear that plenty of time is given to sport during the intensive course, and hastens to add that "Yeovilton is not too monastic" there being some 200 members of the W.R.N.S. stationed there.

The afternoon's programme commenced at 1.30 p.m., gates being opened from 12.30 p.m., and Captain W. K. Edden, O.B.E., R.N., O.C. Yeovilton, introduced the Admiral, who inspected the guard on the parade ground before his address. Music by the station band was followed by an excellent display by the Royal Marine Band from Lympstone and of P.T. to music. For the rest of the period until 7.30 p.m. the huge crowd of visitors were free to examine the many carefully prepared static exhibits and to see the very interesting and representative air display.

The officers and ship's company had spent a whole week preparing for September 6 and a truly excellent job they had done. The station itself was not only made gay by the bright sunshine and flags but every building, flower bed and grassed area was one hundred per cent ship-shape.

Static Display

Each main activity of the station was represented. The airframe section with hydraulic bay, contained a Sea Otter, Firefly, Seafire III and Tiger Moth and here children of all ages after serious examination were, to their delight, allowed to climb into the aircraft and move controls, lower flaps, retract landing wheels or, should they prefer it, operate electric drills and automatic riveters. The dope shop contained a very interesting exhibit in the form of a metal surface divided into areas indicating the several stages—cleaning, filling, doping, etc.—which are required to give a high-speed finish. The engine hangar alone offered sufficient interest for a whole afternoon, and in and around No. 10 hangar could be seen a "bombed-up" Firefly I, Seafire XV, Barracuda and Firebrand. And so it went on all round this large and orderly station.

Flying started at 2.50 p.m. with individual Seafire aerobatics. Lt. (E.) N. Goodhart flung his aircraft around the sky in an orgy of rapid rolls, his hesitation roll was, however, the most polished manœuvre. Other events followed in quick succession and interest was never permitted to lag. Event two was formation flying by 700 Squadron Seafires and Fireflys, the former flight led by Lt. Cdr. E. Illingworth and the latter by Lt. (A.) Hank Adlam. Lt. Cdr. Illingworth had flap trouble on landing and departed for the long runway at near-by Boscombe Down after making a pass at Yeovilton's 1,200-yard E.-W. runway. This is, incidentally, the longest runway, and the wind fortunately co-operated by blowing from the West.

The Westland Aircraft Company next took over, and W/C. Bristow gave an elaborated version of his well-known Sikorsky 51 demonstration. Apart from putting the machine through its omni-directional paces, he rescued aircrew in distress from a dinghy in a water tank and transported two clowns (one lost his trousers) on the end of the winch wire to the hangar roof. Later they were rescued and dropped neatly into the static tank. Transfer of a rescued pilot to a "destroyer" at speed was a new trick. The destroyer was a motor truck driving across the airfield.

About this time the Westland Wyvern which happened to be flying overhead, was called in and Pete Garner showed that it has an impressive turn of speed, can climb inverted with the greatest of ease and roll "with the best of 'em." When the Eagle with its contra-prop gets wound up it has a delightful throaty roar with the suggestion of the "all clear" note as a background. It was mentioned that the Wyvern is capable of carrying every type of Naval weapon.

One disappointment was the non-appearance of the Attacker which was due next. The commentator, who did a first-class job, described what would have been seen from this newest jet fighter in glowing terms—he even credited it with supersonic performance.

In contrast Lt. Cdr. Peter Blake, the next pilot to entertain, gave a soothing glider display. It will be remembered that Lt. Cdr. Blake made an outstanding flight at the Bramcote gliding meeting this year and named Yeovilton for his successful goal flight.

From Boscombe Down

Engines were now started up in the visiting aircraft park and one by one the Sea Fury, Seafire 47, Sea Hornet, Firebrand and Swordfish taxied out to be joined by Sea Vampire and Meteor IV. Several of these machines came from Boscombe and were flown by test pilots from that station. As the Sea Hornet taxied out the pilot amused visitors by folding and spreading his wings. The demonstrations which followed were good. The Vampire pilot executed some delightful long, very slow climbing rolls. The Fury showed a fine turn of speed and some near-vertical rolls. The Sea Hornet made a particularly good take-off and steep climb and followed with a very fast fly past and huge loop. The Meteor, paradoxically, was outstanding for its amazing slow fly-past with flaps down and Derwents scarcely audible. Any doubts there might have been about the speed range and manœuvrability of the Meteor IV—still the world's fastest military aircraft—were dispelled by the next fly-over followed by a long inverted climb and rolls. W/C. Dodred-Dell the pilot, made the most of his outstanding machine. The old Swordfish also performed gracefully.

To round off the flying programme, Harald Penrose, Westland's chief test pilot, took up the old Widgeon for some breath-taking crazy flying.

Fire-fighting and crash rescue were realistically demonstrated on the airfield after the flying and a second showing of the aircraft carrier film *Fighting Lady*, preceded dancing for all on the parade ground. Photographs appear on page 266.

RECORD FLIGHT MONTREAL—LONDON

THE first Canadair "Four" with full cabin pressurization arrived at London Airport on Thursday, 4th September, after a record crossing direct from Montreal to London.

From take off at Montreal to touch down at Heathrow, the distance flown was 3,290 miles and the actual flying time 10¼ hours. The land-to-land flying time was 5 hr 45 min. The average speed for the whole crossing was 313 m.p.h. Full advantage was taken of the Rolls-Royce Merlin engines which are designed for high altitude operation and with the excellent cabin pressurization a height of 21,000ft was maintained throughout the flight. At this height weather conditions were ideal, and the two-stage supercharged Merlin engines easily maintained an output of 950 h.p. per engine. Absolutely no trouble was experienced.

Unpressurized aircraft of this type are in service with Trans-Canada Air Lines and are achieving a utilization factor which is probably higher than any other civil air liner at present in operation. It is to be expected that the pressurized Canadair "Four" will give even better results.

CIVIL AVIATION NEWS

FORERUNNER. *The Hermes Mark II which will be flown exclusively for testing purposes.*

M.C.A. Traffic Scheme Ready for Operation : Air Transport Meeting in S. Africa : America Decides Against Chosen Instrument

HERMES II—FIRST FLIGHT

AT Radlett, on August 2nd, the prototype Handley Page Hermes flew for the first time, and test flying continued during the remainder of last week. It is understood that the aircraft behaved well and showed every indication of being a very promising civil transport. This aircraft, which is known as the Mark II, will be the only one of its kind and is a prototype for the Hermes Marks IV and V. It will be extensively tested in the air, and pressurization, air-conditioning and sound-proofing of the fuselage will each be the subject of special tests. Whereas the Mark II has a tail-wheel undercarriage, the Marks IV and V are designed with a nose-wheel. They will be 6oin longer in the fuselage forward of the wings and 1ooin aft of the wings. The standard production model will also be equipped with a scanner in the nose for search radar. Handley Page are expecting to make first deliveries of the Mark IV to B.O.A.C. by the middle of next summer, and by the beginning of 1949 they hope to be producing at the rate of four each month. Twelve Mark IV Hermes have been ordered for the Empire routes.

TRAFFIC CONTROL SCHEME

OWING to manning difficulties the Ministry of Civil Aviation are still unable to put into effect an air traffic control scheme for the United Kingdom. In the March 20th issue of *Flight* a plan for a provisional scheme was outlined. This scheme has now been approved and regulations have been printed in a Notice to Airmen with October 1st as the effective date. The Ministry, however, are unable to bring the scheme into operation until man-power is made available by the Ministry of Labour. Control will affect only scheduled aircraft flying in Instrument Flight Rule conditions, and all other aircraft are still allowed to fly according to Visual Flight Rule conditions. Flight Information Regions have been formed to cover the whole of the United Kingdom, and in the south-east and south-west of England there are two Control Areas in which more strict control will be attempted. Aircraft without radar aids will not be permitted to fly in the controlled areas when Instrument Flight Rule conditions are in force. The Ministry possesses no mandatory power for enforcing the regulations, but legislation will eventually grant such powers and enable action to be taken against offenders. When eventually the scheme is put into operation there will be little more actual control than at present, but the air traffic control organization should have more precise information of the movement of aircraft. As well as safeguarding the movement of passenger aircraft in the air it will make all users conscious of control, so that as radar aids develop and lightweight radio sets become available, complete control will be more easily introduced and all users, including scheduled line, charter companies, private owners and the Services will have had useful experience.

This attempt by the Ministry of Civil Aviation to create some order in the air is by no means premature and is in accordance with I.A.C.O. requirements. Holland already has a similar scheme in operation, and France, Portugal and Belgium are developing air traffic control on the area system.

SOUTH AFRICAN AIR TRANSPORT COUNCIL

ON August 18th and 19th the South African Air Transport Council met at Victoria Falls. Representatives of South Africa, N. and S. Rhodesia, Nyasaland and East Africa territories, and members of all the Government air lines concerned, B.O.A.C., South African Airways, Central African Airways and East African Airways, were there. The chairman was Colonel Sir Ernest Guest, Minister for Defence and Air, Southern Rhodesia, and the British delegation was led by Sir Frederick Bowhill.

There was a significant tendency in the discussions to safeguard the interests of the various governments' "chosen instruments," and it was decided that the applications received from some European countries to fly over South African territories would have to wait until more concrete proposals were made. It was decided to recommend that all non-scheduled operators should be more strictly licensed and controlled than they were at present. By the end of September all the member countries of the Council will be required to make a survey of existing equipment and make recommendations for the future needs of air transport.

It was decided to provide three air-traffic control centres at Nairobi, Salisbury and Johannesburg. It was also decided to adopt the quadrantal height system of separation for aircraft and to create a new communications system to advise operators at short notice on the state of airfields and services. Salisbury (Southern Rhodesia) is to be responsible for investigating accidents in that country, Northern Rhodesia and Nyasaland, but Pretoria will be responsible for South Africa, Tanganyika, Kenya, Uganda and Zanzibar.

It is understood that the British delegation saw the latest developments at the B.O.A.C. flying-boat base at Victoria Falls. The main alighting place is a stretch of water 500 yds wide and 2,500 yds long on the Zambesi about three miles

Civil Aviation News . . . . .

upstream from the Falls on the south side of a long island. A complete new wing is being built on to the hotel to provide 50 bedrooms for the passengers and crew on the flying-boat services.

TRANS-SAHARA HALTONS

THE B.O.A.C. trans-Sahara service to West Africa started on September 1st. Haltons will fly five times a week in each direction between London and Accra taking less than 24 hours for the journey. The new service has replaced that which was operated by B.O.A.C. between London through Casablanca and Bathurst to Accra and Lagos, for which two days was normally taken. Bathurst, Freetown and Takoradi continue to be linked to Lagos and the main traffic route by a weekly service scheduled to be extended shortly to Dakar to connect with the B.S.A.A. services. The Haltons are furnished to accommodate ten passengers and there is cargo space for freight and mail.

INDIAN AEROCAR

WITH a capital of £1,125,000 a company has been formed in Inda to produce the Portsmouth Aerocar. The company plans to construct a works and plant at Port Sika, but immediate production will be commenced at Jamnagar. Mr. E. L. Granville, who is the chairman and managing director of the Portsmouth Aviation Company at Portsmouth, will also be chairman of the Indian company. Mr. G. Foster has been invited to become deputy chairman of the company at Portsmouth, and Mr. L. M. J. Balfour is expected to go to India as resident joint managing director of the Indian company. Mr. W. H. Jenks, secretary and director has already gone to India on the Board of that company. Mr. J. R. C. Miller is to become a director in Portsmouth and Major F. L. Luxmoore is to become the director in charge of the development of the Aerocar and technical adviser to both companies. It is understood that the provisional orders now number 288 representing £1,750,000.

NO CHOSEN INSTRUMENT FOR U.S.

ON the grounds that competition stimulated development the special co-ordinating committee set up by President Truman has rejected the idea of a chosen instrument for all American commercial air operations overseas. The committee considered that the single air line scheme would allow a small group to interfere in operations of national interest and that the argument for such an instrument on the grounds of national security was not convincing.

It was recommended that subsidies for mail carrying should be granted only to support air lines if there was benefit to commerce and to national defence. The committee also reasserted that the U.S. supported the I.C.A.O. and that multi-lateral exchange of flying over other nations' territory was essential to the full development of international civil aviation. It was considered that a multi-lateral agreement should be drafted embodying the general principles under which international air operations could be conducted.

BREVITIES

AUSTRALIA has opposed proposals that Japan should be allowed to develop a fleet of civil aircraft, on the grounds that such a fleet would provide the nucleus of an air force.

* * *

Three Dakotas have been purchased by British European Airways from R. K. Dundas, Ltd., for use with Cyprus Airways. They are at present being overhauled and converted by Scottish Aviation, Ltd., into 21-seater passenger transports, but are expected to be in operation by the end of this year.

* * *

Mr. K. T. Spencer, Deputy Director of Aircraft Research and Development (Airworthiness) at the Ministry of Supply, will lead the British delegation to the I.C.A.O. meeting in Paris on September 23rd. Other delegates will be Mr. D. Rolinson, M.C.A.; Mr. P. A. Hufton, A. & A.E.E.; Mr. E. L. Beverley, M.C.A.; Mr. N. V. Lindemere, M.C.A.; and Mr. W. Tye, A.R.B.

* * *

Rongotai Airport, Wellington, will be closed to commercial air traffic from September 27th, after which services will operate from Paraparamu, thirty miles north of the capital. Rongotai does not comply with international safety standards and expansion would require the demolition of property.

CELEBRATION PARTY: Mr. J. P. Jeffcock, Director-General of Civil Aviation in Pakistan (left), is talking to Mr. M. A. H. Ispahany, managing director of Orient Airways; on the right is Mr. G. H. C. Lee, Southern Asia manager of B.O.A.C. The occasion was a party at Korangi Marine Air Base, Karachi, given by the Corporation in connection with Independence celebrations.

* * *

Passengers carried by British West Indian Airways for the period January to July, 1947, numbered 19,942, an increase of 1,860 over the figures for the same six months last year.

* * *

A draft agreement has been drawn up between the United Kingdom and Uruguay concerning air navigation. Details of the agreement have not yet been released.

* * *

Traffic rights at Shannon have been granted to Trans-Canada Airlines for one flight weekly in each direction. As from October 1st T.C.A. North Stars will leave London Airport four days a week for Montreal, calling at Shannon each Wednesday. On Tuesdays, Fridays and Sundays departure will be from Prestwick.

* * *

Whilst in Auckland, Lord Nathan said that after the Brabazon I had established itself on the North Atlantic route, he hoped it would fly over the Kangaroo route to Australia, provided suitable airfields could be made available. He also hinted that Auckland harbour would be suitable for operating the S.R.45.

* * *

An Air Line Representatives Club of Switzerland (A.R.C.O.S.) has been formed with P. C. Desautels, of T.W.A., and C. E. Kauffman, of K.L.M., as joint presidents. Eugene Groh, managing director of Swissair, has been elected an honorary member and representatives of ten airlines operating into Switzerland have been made permanent members.

* * *

K.L.M. have taken delivery of two Gold Plate Constellations, both equipped with Speedpak freight containers and having accommodation for 44 seats, which are convertible to 20 sleeping berths. A loudspeaker system in the aircraft allows flight information to be broadcast to the passengers. The Dutch airline now has eight Constellations in operation.

* * *

Under the I.C.A.O. agreement that thirteen weather ships were to be stationed in the North Atlantic the United States undertook to establish seven such ships. It is understood, however, that the U.S. Coastguard organization, which is to be responsible for the ships, has stated that only two will be established unless additional funds are provided for the purpose.

* * *

Mr. Francis A. Roberts has been appointed Chief Engineer to Aer Linte Eireann. He was principal Production Officer of the Directorate of Aircraft Production in the Ministry of Supply. Aer Lingus, the associated company, carried in 761 flights 13,467 passengers between Ireland, Britain and the Continent during July. The increase was approximately 25 per cent on the figures for July last year. The company now flies a freight service once a week between Dublin and Northolt.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

THE TUDOR TRAGEDY

A Memorial to Roy Chadwick

THE untimely loss of Roy Chadwick has come as a profound shock, not only to all who knew him personally but to the whole aircraft industry. Above all it will be an irreparable loss to the British aircraft industry as regards aircraft design, just as was the death of Juan de la Cierva in the rotating-wing field of aircraft design. Had it not been for Cierva's untimely end, we should now have been leading the world in helicopter design instead of toddling along at the tail.

Whatever others may think, the writer is of the opinion that Roy Chadwick wrought his greatest miracle in 1923 when, for the Lympne Light Plane Trials, he designed a marvellous little biplane (powered by a diminutive Douglas motor cycle engine of 2¾ h.p.) which, piloted by W/C. Hamersley, reached a height of some 14,000ft.

The man in the street is aware that he owes an irreparable debt to Roy Chadwick for the design of the Lancaster bomber —the greatest single contributory factor in putting Germany out of the war. For these and other aeronautical achievements the writer is of the opinion that some lasting memorial (preferably of a technical nature) should be set up to the memory of Roy Chadwick.

E. V. HAMMOND.

LIMIT OF LANDPLANE SIZE

Saving English Countryside from Bulldozer

AS an amateur student of aeronautics, may I add my puny support to Capt. Neville Stack's letter, published in *Flight* on August 28th?

I would go further and say that modern large four-engined aircraft already exceed the practicable limit of size for landplanes. To anyone who points out that aircraft of comparable size were necessary in war, the answer is that these warplanes were built in ignorance of the possibilities of rocket and atomic power and one also wonders, considering the performance of the Mosquito, whether such large warplanes were in fact necessary.

How many air passengers have an ultimate destination within a short car journey of the airport at which they land? How many air passengers make a long-distance journey which does not involve transhipment from a main to a feeder line and/or vice versa? How much time is saved over surface transport on a long-distance flight even though the journey is made by flying-boat with transhipment from and to a feeder line at each end?

When the constructors and operators of aircraft find the answers to these questions (and see the helicopters hovering in the future) Langstone Harbour will become London's world airline terminus, Heathrow will revert to market gardening, and England's beautiful countryside will be saved from the bulldozer.

"MOONRAKER."

RUNWAY SIGNALS

Why Not Green Lights?

ON March 8th another Viking made another safe landing at Northolt. But only just.

The driver of a vehicle approaching the down-wind end of the "live" runway failed to see the red light signal from the Runway Controller's van and proceeded at a steady 30 m.p.h. on to the runway. At the last moment the driver saw the Viking approaching, swerved, skidded and stopped. The aircraft passed within a few feet of the vehicle.

If, as might well have happened, the driver had not, at that precise moment, seen the aircraft, then almost certainly there would have resulted a very serious accident. It was as close as that.

Inevitably this would have resulted in a Court of Enquiry, not to mention the tragic consequences, and as a result elaborate precautions would no doubt be taken to prevent any recurrence. Instances of this kind, when vehicles, cyclists and pedestrians cross the runway against a red light from the Runway Controller are by no means rare at Northolt, although, of course, they don't all cause palpitations.

The excuse is always the same—"I didn't see any red light." It appears obvious that the only immediate solution is the positive attitude. If a driver has to see a red light before he is required to stop, then he probably won't. If he has to wait for a green light before he can proceed, then, without doubt, he'll see it.

So it was proposed, at a local meeting of Runway Controllers, that two large boards, "STOP AND WAIT FOR GREEN LIGHT," be placed on each side of the runway, beside the perimeter track. Similarly, that "NO ENTRY" boards be placed at strategic points on each side of the runway to prevent contractors' vehicles making a dangerous dash across the runway when it is in use. The airfield police could enforce these rules, which would soon become a habit.

These proposals were submitted and approved in early March. No doubt the Central Registry could produce a formidable dossier of correspondence on the subject, but it would surely be better if the carpenters produced the boards!

However, all is not lost, for the airport management, winking its eye at the drivers who dice with death, expresses its deep concern over the damage caused by pedestrians to the grass areas, and "KEEP OFF THE GRASS" boards are appearing in profusion.

I wonder what crazy system of priorities exists—or, indeed, if there is a system at all.

PETER J. CROFTS.

WORLD SPEED RECORD

Short Course Effect on Time Difference

I HAVE been interested in your report "New Speed Records" (*Flight*, Aug. 28th) and the advance of 34.6 m.p.h. in speed over the British record made last year. Calculated in actual time is an improvement of just more than one half a second or to be precise .58 seconds.

We know the course is a very short one of 1.864 miles, and that the regulations insisting on the use of such a short course are now very much out of date since the speeds have become so high.

It is therefore interesting to compare the times and speeds of the latest attempts on the world's speed record: Great Britain, 1946, speed 616 m.p.h., time 10.89 sec.; U.S.A., 1947, speed 650.6 m.p.h., time 10.31 sec.

An improvement of half a second is not much to shout about.

GEORGE CHAPMAN.

A.T.C. WAR MEDALS

Little Encouragement for Volunteers

IN response to S/L. Humphries' letter (*Flight*, July 24th) the official "hand-out" stated that the Admiralty and War Office had decided not to grant medals to their junior organization officers, and the Air Ministry had agreed to fall in line. This surely confirms the statement in Air Chief Marshal Harris's book that when questions affecting the three Services arose the Air Ministry were always ready to sacrifice their own personnel.

Two points, however, are conveniently ignored: (a) of the three, only A.T.C. officers were alleged to hold the King's Commission, and, if this is so, they must be the only commissioned officers to be excluded from even minor awards; (b) during the "blitz" and "buzz-bomb" attacks, particularly in London, parades and instruction were carried on as a Service duty.

After several years voluntary uniformed service in two wars, I am beginning to understand that volunteers are looked upon as fools and treated accordingly. Little wonder volunteers are so difficult to get for full or part-time duties.

PER ARDUA PLUS.

FORTHCOMING EVENTS

Sept. 9th to 12th.—S.B.A.C. Exhibition and Display.
Sept. 13th to 15th.—Cannes Aero Club "Ailes d'Azur" Film Festival air rally. Cannes-Mandelieu airfield.
Sept. 14th.—Royal Aeronautical Society: Garden party, Radlett airfield.
Sept. 17th to 19th.—Federation Aeronautique Internationale: Annual General Conference, Geneva.
Sept. 23rd.—R.Ae.S. (Graduate and Student). Discussion "The Design of Wings": Introduced by F. Tyson, A.F.R.Ae.S.
Sept. 25th.—Air League of the British Empire: Annual General Meeting, 1, Pall Mall East, S.W.1.
Sept. 27th.—Society of Licensed Aircraft Engineers: "Liquid Springs." R. H. Bound, F.R.Ae.S., M.I.M.E., A.M.A.E.
Oct. 19th to Nov. 24th.—Royal Aero Club of Belgium: Air rally to the Belgian Congo. Brussels to Le Kivu.
Oct. 21st.—R.Ae.S. (Graduate and Student). "Interplanetary Flight and Rocket Propulsion." A. V. Cleaver, A.F.R.Ae.S.

SERVICE AVIATION

SEA SCOURGE: A new "Flight" photograph of the Bristol Brigand long-range strike fighter as now being supplied to the R.A.F. The aircraft shown has the latest clear-vision cockpit enclosure and carries a full war load of eight R.P.s and a torpedo.

Award

THE King has been graciously pleased to approve the following award:—

MILITARY MEDAL

W/O. Richard Bernard Pape, R.A.F.V.R., No. 15 Squadron.

W/O. Pape completed nine operational sorties as navigator between July 7th, 1941, and September 7th, 1941. His aircraft was shot down on September 7th, 1941, near the Dutch-German frontier. Although badly burned and suffering from head and hand injuries, he made his way on foot to Amsterdam. There he made contact with an organization which made arrangements for him to be shipped back to the United Kingdom. Unfortunately, W/O. Pape was then arrested by the Special Police and subjected to severe torture in an unsuccessful effort to obtain from him details of his helpers. Five months later, he made another bid for freedom when he escaped from a coal mine in Poland and made his way on foot to Cracow. At this time, his health was in such a poor state that he collapsed at the station while waiting for a train. He was again rearrested and, after a period of concentration camp treatment, was again put to work. A year later, W/O. Pape again escaped and walked through Slovakia, attempting to reach Yugoslavia. He was rearrested and afterwards developed meningitis, temporary blindness and pleurisy, which kept him in hospital for about a year. Whilst in hospital, he continued his underground activities. He also gave secret propaganda talks to the other inmates. Throughout the 3½ years of his captivity W/O. Pape was outstanding in upholding the Royal Air Force policy of never submitting to being a prisoner of war.

New Air Attaché

COLONEL CARLOS SARTORIUS gave a farewell cocktail party at the Dorchester on September 4th on the occasion of relinquishing his post as Spanish Air Attaché. During his stay in England Col. Sartorius has made numerous friends, who are sorry to lose him, but who wish him well in the new tasks he is undertaking in his native country. Col. Sartorius is succeeded by Lt. Col. Rute, to whom British aviation circles extends a welcome.

Brazilian Air Staff Chief Here

THE Chief of Staff of the Brazilian Air Force, Major-General Gervasio Duncan de Lima Rodrigues, arrived at London Airport by B.S.A.A. last Friday for a three-week's tour of the Royal Air Force and the British aircraft industry. He was met at the airport by A.V-M. A. MacGregor, A.O.C. Administration at the headquarters of Fighter Command, representing the Secretary of State for Air, at whose invitation he is coming. He began his tour by visiting the Air Ministry, where he was received by the Secretary of State and Chief of the Air Staff.

Royal Air Force and Naval Aviation News and Announcements

Appointment

THE Air Ministry announces the appointment of A.V-M. Thomas Arthur Warne-Browne, C.B., C.B.E., D.S.C., as Senior Technical Staff Officer, Mediterranean and Middle East Command.

A.V-M. Warne-Browne has been Air Officer Commanding No. 43 Group, Maintenance Command, since February, 1946, and was formerly Senior Engineer Staff Officer at Coastal Command headquarters from July, 1942. Previously he was for nearly two years on Air Staff engineering duties at the headquarters of Technical Training Command, to which he went in September, 1940, after having been for three years on engineering duties at R.A.F. Station Gosport.

Sir John Slessor's New Post

THE appointment, effective from December 31st, has been announced of Air Chief Marshal Sir John Slessor to succeed General Sir William Slim as Commandant of the Imperial Defence College. Air Chief Marshal Slessor is now Air Council Member for Personnel, having received the apointment in April, 1945.

New D.P.R.

THE Air Ministry announces that Air Chief Marshal Sir Philip Joubert de la Ferte, K.C.B., C.M.G., D.S.O., is relinquishing the post of Director of Public Relations at the Air Ministry at the end of this month. He is succeeded by Mr. L. M. MacBride, O.B.E., who will hold the post under the new title of Chief Information Officer, Air Ministry.

Mr. MacBride has been for the past two years Public Relations Officer to the U.K. High Commissioner in Australia, in charge of the U.K. information services in the Commonwealth. He returned from Australia in July. Born in London in 1902 he was educated at St. Paul's School and joined the *Daily Express* in 1921, becoming Assistant News Editor, 1927. In 1930 he was appointed News Editor of the reorganized *Daily Herald*, Foreign Editor, 1931, and News Services Editor, in charge of home and overseas news, 1937. In September, 1939, he was appointed to the Foreign Publicity Division of the Ministry of Information and subsequently was in charge of the section supplying material to H.M. Forces' newspapers.

R.A.F. at Prague

AT the invitation of the Czechoslovakian Minister of National Defence the Royal Air Force sent a Meteor IV and a Vampire I from Fighter Command, and the York from Transport Command usually set aside for the Prime Minister's use, to take part in an air display at Prague on September 7th. The Meteor and Vampire, accompanied by a York carrying servicing personnel and

Service Aviation . . . . .

ground equipment, left Manston on September 5th, and the Prime Minister's York carrying A.V-M. D. I. Hardman, Assistant Chief of the Air Staff (Operations) and Mrs. Hardman, left Northolt on September 6th. The Prime Minister's York was captained by S/L. J. F. Sach, D.F.C., A.F.C., one of the best-known pilots in Transport Command, who flew Mr. Winston Churchill and other members of the War Cabinet, as well as many high-ranking officers of the three services, on various missions during the war.

Accident Prevention Demonstration

A DAKOTA, equipped as a flying exhibition and carrying a team of lecturers of the R.A.F. Accident Prevention Directorate left Manston on September 4th on a 34,000-mile tour of R.A.F. Commands, including Japan.

R.U.S.I. Lecture

ON Wednesday, October 1st, at 3 p.m., General Sir William Slim, G.B.E., K.C.B., D.S.O., M.C., will lecture at the Royal United Service Institution, Whitehall, on "Higher Training for Combined Command." The chair will be taken by Field-Marshal Lord Wilson of Libya, G.C.B., G.B.E., D.S.O. (Chairman of the Council). Members of the Institution may introduce two friends to this lecture.

Stations Open on September 20th

SEVENTY-FIVE R.A.F. stations will be open to the public on Saturday, Sept. 20th to commemorate the seventh anniversary of the Battle of Britain. This year it has been found possible to open a greater number than before (last year 60 stations were "at home"). Attractive programmes designed both to instruct and entertain the visitors are being arranged at stations, at most of which there will be flying displays. Admission will be free, but there will be a car park charge, and the net proceeds from this source and from collecting boxes will be equally divided between the R.A.F. Benevolent Fund and the R.A.F. Association.

The stations to be "at home" are:—

County	R.A.F. stations
Aberdeenshire ...	Dyce (R)
Angus	Edzell (M)
Antrim N.I. ...	Aldergrove (C)
Bedfordshire ...	Henlow (T.T.) and (M)
Berkshire	Abingdon (T)
Buckinghamshire...	Booker (F.T.) Halton (T.T.)
Cambridgeshire ...	Waterbeach (T)
Cheshire	Hawarden (M)
Cornwall	St. Eval (C)
Cumberland ...	Kirkbride (M) Silloth (M)
Devon	Chivenor (F) Mount Batten (M)
Dumfries-shire ...	Dumfries (M)
Essex	Debden (T.T.)
Fifeshire	Louchars (C)
Glamorganshire ...	St. Athan (T.T.) and (M)
Gloucestershire ...	Aston Down (M) Little Rissington (F.T.)
Hampshire ...	Calshot (C) Odiham (F) Thorney Island (C)
Huntingdonshire ...	Upwood (B) Wyton (B)
Kent	Biggin Hill (R) West Malling (F)
Lancashire ...	Kirkham (T.T.) Weeton (T.T.)
Leicestershire ...	Wymeswold (T)
Lincolnshire ...	Binbrook (B) Coningsby (B) Cranwell (F.T.) Hemswell (B) Kirton-in-Lindsey (F.T.) Manby (F.T.) Spitalgate (F.T.) Waddington (B)
London	Hendon (T)
Isle of Man ...	Jurby (F.T.)
Midlothian ...	Turnhouse (R)
Norfolk	Bircham Newton (T) Feltwell (F.T.) Horsham St. Faith (F) Marham (B) Swanton Morley (T.T.) Watton (90 Group)
Northumberland ...	Acklington (F) Ouston (F.T.)
Nottinghamshire ...	Syerston (T)
Oxfordshire ...	Benson (C)
Rutlandshire ...	Cottesmore (F.T.)
Shropshire ...	Shawbury (F.T.) Stoke Heath (M) Tornhill (F.T.)
Somersetshire ...	Locking (T.T.)
Staffordshire ...	Cosford (T.T.) Lichfield (M)
Suffolk	Honington (T) Mildenhall (B) Stradishall (B)
Wigtownshire ...	Wig Bay (M) Wigtown (M)
Wiltshire	Colerne (M) Hullavington (F.T.) Lyneham (T) Melksham (T.T.)
Worcestershire ...	Pershore (T)
Yorkshire	Church Fenton (F) Dishforth (T) Driffield (F.T.) Leconfield (F.T.) — Lindholme (B) Linton-on-Ouse (F) Topcliffe (F.T.)

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Sir Hugh Saunders Decorated By U.S.A.

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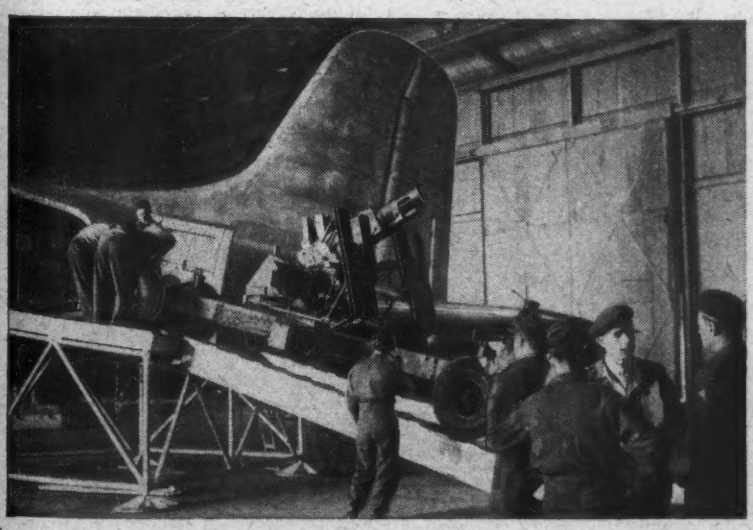
Handley Page Hastings

ABOUT eighteen months ago the prototype of the Handley Page Hastings four-engined military transport made its first flight, and it is now permissible to disclose additional particulars. The Hastings is in full-scale production for the R.A.F. and has a top speed of 354 m.p.h. at 23,700ft. At 10,000ft the maximum weak mixture speed is 276 m.p.h., and at 25,000ft the corresponding figure is 293 m.p.h. Flying at its maximum weight of 75,000lb the Hastings has an initial rate of climb of 1,100 ft/min.

Service roles will include those of freighter, paratrooper, ambulance, troop transport, supply dropping aircraft and glider tug. Military equipment, such as bulldozers, 25-pounder anti-tank guns and 3-ton lorries, up to a total weight of 7½ tons, are accommodated, and 50 fully-equipped airborne troops may be carried in the troop transport version. Load-carrying capabilities as a pannier and supply dropping aircraft are exemplified by the following typical loads: 22 × 350lb panniers or 20 × 400lb containers, and two despatchers. As a tug the Hastings is capable of towing the largest type of Service glider.



BOARDING PARTY: A 40mm Bofors anti-aircraft gun on the air-transportable loading ramp of the Handley-Page Hastings. New details of the Hastings appear on this page.

Battle of Britain Fly-past

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SERVICE AVIATION

SEA SCOURGE: A new "Flight" photograph of the Bristol Brigand long-range strike fighter as now being supplied to the R.A.F. The aircraft shown has the latest clear-vision cockpit enclosure and carries a full war load of eight R.P.s and a torpedo.

Award

THE King has been graciously pleased to approve the following award:—

MILITARY MEDAL

W/O. Richard Bernard Pape, R.A.F.V.R., No. 15 Squadron.

W/O. Pape completed nine operational sorties as navigator between July 7th, 1941, and September 7th, 1941. His aircraft was shot down on September 7th, 1941, near the Dutch-German frontier. Although badly burned and suffering from head and hand injuries, he made his way on foot to Amsterdam. There he made contact with an organization which made arrangements for him to be shipped back to the United Kingdom. Unfortunately, W/O. Pape was then arrested by the Special Police and subjected to severe torture in an unsuccessful effort to obtain from him details of his helpers. Five months later, he made another bid for freedom when he escaped from a coal mine in Poland and made his way on foot to Cracow. At this time, his health was in such a poor state that he collapsed at the station while waiting for a train. He was again rearrested and, after a period of concentration camp treatment, was again put to work. A year later, W/O. Pape again escaped and walked through Slovakia, attempting to reach Yugoslavia. He was rearrested and afterwards developed meningitis, temporary blindness and pleurisy, which kept him in hospital for about a year. Whilst in hospital, he continued his underground activities. He also gave secret propaganda talks to the other inmates. Throughout the 3½ years of his captivity W/O. Pape was outstanding in upholding the Royal Air Force policy of never submitting to being a prisoner of war.

New Air Attaché

COLONEL CARLOS SARTORIUS gave a farewell cocktail party at the Dorchester on September 4th on the occasion of relinquishing his post as Spanish Air Attaché. During his stay in England Col. Sartorius has made numerous friends, who are sorry to lose him, but who wish him well in the new tasks he is undertaking in his native country. Col. Sartorius is succeeded by Lt. Col. Rute, to whom British aviation circles extends a welcome.

Brazilian Air Staff Chief Here

THE Chief of Staff of the Brazilian Air Force, Major-General Gervasio Duncan de Lima Rodrigues, arrived at London Airport by B.S.A.A. last Friday for a three-week's tour of the Royal Air Force and the British aircraft industry. He was met at the airport by A.V-M. A. MacGregor, A.O.C. Administration at the headquarters of Fighter Command, representing the Secretary of State for Air, at whose invitation he is coming. He began his tour by visiting the Air Ministry, where he was received by the Secretary of State and Chief of the Air Staff.

Royal Air Force and Naval Aviation News and Announcements

Appointment

THE Air Ministry announces the appointment of A.V-M. Thomas Arthur Warne-Browne, C.B., C.B.E., D.S.C., as Senior Technical Staff Officer, Mediterranean and Middle East Command.

A.V-M. Warne-Browne has been Air Officer Commanding No. 43 Group, Maintenance Command, since February, 1946, and was formerly Senior Engineer Staff Officer at Coastal Command headquarters from July, 1942. Previously he was for nearly two years on Air Staff engineering duties at the headquarters of Technical Training Command, to which he went in September, 1940, after having been for three years on engineering duties at R.A.F. Station Gosport.

Sir John Slessor's New Post

THE appointment, effective from December 31st, has been announced of Air Chief Marshal Sir John Slessor to succeed General Sir William Slim as Commandant of the Imperial Defence College. Air Chief Marshal Slessor is now Air Council Member for Personnel, having received the apointment in April, 1945.

New D.P.R.

THE Air Ministry announces that Air Chief Marshal Sir Philip Joubert de la Ferte, K.C.B., C.M.G., D.S.O., is relinquishing the post of Director of Public Relations at the Air Ministry at the end of this month. He is succeeded by Mr. L. M. MacBride, O.B.E., who will hold the post under the new title of Chief Information Officer, Air Ministry.

Mr. MacBride has been for the past two years Public Relations Officer to the U.K. High Commissioner in Australia, in charge of the U.K. information services in the Commonwealth. He returned from Australia in July. Born in London in 1902 he was educated at St. Paul's School and joined the *Daily Express* in 1921, becoming Assistant News Editor, 1927. In 1930 he was appointed News Editor of the reorganized *Daily Herald*, Foreign Editor, 1931, and News Services Editor, in charge of home and overseas news, 1937. In September, 1939, he was appointed to the Foreign Publicity Division of the Ministry of Information and subsequently was in charge of the section supplying material to H.M. Forces' newspapers.

R.A.F. at Prague

AT the invitation of the Czechoslovakian Minister of National Defence the Royal Air Force sent a Meteor IV and a Vampire I from Fighter Command, and the York from Transport Command usually set aside for the Prime Minister's use, to take part in an air display at Prague on September 7th. The Meteor and Vampire, accompanied by a York carrying servicing personnel and

Service Aviation . . . . .

ground equipment, left Manston on September 5th, and the Prime Minister's York carrying A.V-M. D. I. Hardman, Assistant Chief of the Air Staff (Operations) and Mrs. Hardman, left Northolt on September 6th. The Prime Minister's York was captained by S/L. J. F. Sach, D.F.C., A.F.C., one of the best-known pilots in Transport Command, who flew Mr. Winston Churchill and other members of the War Cabinet, as well as many high-ranking officers of the three services, on various missions during the war.

Accident Prevention Demonstration

A DAKOTA, equipped as a flying exhibition and carrying a team of lecturers of the R.A.F. Accident Prevention Directorate left Manston on September 4th on a 34,000-mile tour of R.A.F. Commands, including Japan.

R.U.S.I. Lecture

ON Wednesday, October 1st, at 3 p.m., General Sir William Slim, G.B.E., K.C.B., D.S.O., M.C., will lecture at the Royal United Service Institution, Whitehall, on "Higher Training for Combined Command." The chair will be taken by Field-Marshal Lord Wilson of Libya, G.C.B., G.B.E., D.S.O. (Chairman of the Council). Members of the Institution may introduce two friends to this lecture.

Stations Open on September 20th

SEVENTY-FIVE R.A.F. stations will be open to the public on Saturday, Sept. 20th to commemorate the seventh anniversary of the Battle of Britain. This year it has been found possible to open a greater number than before (last year 60 stations were "at home"). Attractive programmes designed both to instruct and entertain the visitors are being arranged at stations, at most of which there will be flying displays. Admission will be free, but there will be a car park charge, and the net proceeds from this source and from collecting boxes will be equally divided between the R.A.F. Benevolent Fund and the R.A.F. Association.

The stations to be "at home" are:—

County	R.A.F. Stations
Aberdeenshire ...	Dyce (R)
Angus	Edzell (M)
Antrim N.I. ...	Aldergrove (C)
Bedfordshire ...	Henlow (T.T.) and (M)
Berkshire	Abingdon (T)
Buckinghamshire...	Booker (F.T.) Halton (T.T.)
Cambridgeshire ...	Waterbeach (T)
Cheshire	Hawarden (M)
Cornwall	St. Eval (C)
Cumberland ...	Kirkbride (M) Silloth (M)
Devon	Chivenor (F) Mount Batten (M)
Dumfries-shire ...	Dumfries (M)
Essex	Debden (T..T.)
Fifeshire	Louchars (C)
Glamorganshire ...	St. Athan (T.T.) and (M)
Gloucestershire ...	Aston Down (M) Little Rissington (F.T.)
Hampshire ...	Calshot (C) Odiham (F) Thorney Island (C)
Huntingdonshire ...	Upwood (B) Wyton (B)
Kent	Biggin Hill (R) West Malling (F)
Lancashire ...	Kirkham (T.T.) Weeton (T.T.)
Leicestershire ...	Wymeswold (T)
Lincolnshire ...	Binbrook (B) Coningsby (B) Cranwell (F.T.) Hemswell (B) Kirton-in-Lindsey (F.T.) Manby (F.T.) Spitalgate (F.T.) Waddington (B)
London	Hendon (T)
Isle of Man ...	Jurby (F.T.)
Midlothian ...	Turnhouse (R)
Norfolk	Bircham Newton (T) Feltwell (F.T.) Horsham St. Faith (F) Marham (B) Swanton Morley (T.T.) Watton (90 Group)
Northumberland ...	Acklington (F) Ouston (F.T.)
Nottinghamshire ...	Syerston (T)
Oxfordshire ...	Benson (C)
Rutlandshire ...	Cottesmore (F.T.)
Shropshire ...	Shawbury (F.T.) Stoke Heath (M) Tornhill (F.T.)
Somersetshire ...	Locking (T.T.)
Staffordshire ...	Cosford (T.T.) Lichfield (M)
Suffolk	Honington (T) Mildenhall (B) Stradishall (B)
Wigtownshire ...	Wig Bay (M) Wigtown (M)
Wiltshire	Colerne (M) Hullavington (F.T.) Lyneham (T) Melksham (T.T.)
Worcestershire ...	Pershore (T)
Yorkshire	Church Fenton (F) Dishforth (T) Driffield (F.T.) Leconfield (F.T.) Lindholme (B) Linton-on-Ouse (F) Topcliffe (F.T.)

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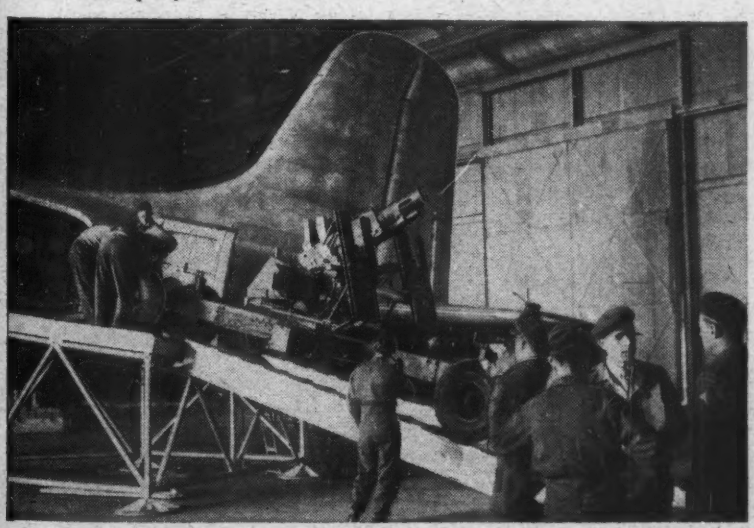

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Service Aviation . . . . .

counties in the morning, and half this force flying over South and West England areas in the afternoon. The London area fly-past will be led by a Hurricane.

The displays will only take place if the aircraft can fly at 1,000 to 2,000 feet in the London area and 2,000 feet in the South and West areas. If the weather is too bad to fly in the morning the London area fly-past will be postponed until the afternoon and the second fly-past cancelled. A "bad weather" plan may be substituted for the London area fly-past in the morning or afternoon, however, in the event of poor visibility or low cloud.

Britannia Shield Contest

ON September 15th a Netherlands destroyer will sail up the Thames bringing teams of Netherlands Service sportsmen to compete against Great Britain and six other nations for the Britannia Shield. The competitions will be held during the week commencing September 15th, and Marshal of the R.A.F. Viscount Portal of Hungerford will present the Trophy at the Empire Pool, Wembley, on September 19th.

617 Nears End of Tour

LINCOLNS of No. 617 Squadron arrived at Andrews Field, Washington, on August 25th, for final servicing before crossing the Canadian border to Trenton, Toronto. A high standard of serviceability has been maintained by the Squadron ground crews, who have forfeited pleasure trips to attend to the aircraft. On the following Saturday, Mr. Gerald F. Tyrrell, British Consul General, New Orleans, presented British D.F.C.s to five colonels of the U.S.A.A.F. for hazardous wartime missions and next day, W/C. C. D. Milne, D.F.C., visited Oakwood Cemetery, Montgomery, where British airmen killed during the war training are buried. On behalf of the Squadron he laid a wreath on the graves. At Fort Worth, Texas, the citizens arranged a special rodeo for the Squadron, and several members, including W/C. Milne and S/L. A. R. Lang took part. F/L. J. Simpson, five feet three inches tall, and the squadron's smallest pilot, rode a calf.

A Sunderland Cruise

THREE Short Sunderland Mk. V flying-boats of No. 205 Squadron, powered with American Pratt and Whitney Twin Wasp engines, will leave their Ceylon base on "Operation Seahawk" within a few days. This calls for a 10,000 mile training flight across the Indian Ocean to Durban and back, during which calls will be made on outposts of the British Commonwealth. The crews will spend at least three full days' flying time (72 hours) in the air, and the round trip is expected to last from a fortnight to a month. Each aircraft will carry a normal complement of ten men, comprising air crew and ground crew, together with equipment and spares.

Operation Longstop

ON September 22nd and 23rd, Transport Command and the Army's 2nd Parachute Brigade Group are to carry out the first airborne manœuvres in England since the end of the war. This Exercise will be called "Longstop." Squadrons of Transport Command providing the aircraft will be under the command of A.V-M. A. L. Fiddament, C.B.E., D.F.C., A.O.C. No. 38 Group, R.A.F. The exercise will start on the evening of September 22nd when aircraft flying in formation will drop about 700 men, with their guns, jeeps, and supplies, to capture the airfield at Netheravon. Next morning a parachute battalion with its guns and equipment will land by parachute and glider as reinforcements and when the airfield is securely held a third battalion with its supporting arms will land in aircraft on the airfield. The second phase of the Exercise will be an Air Transport demonstration at Brize Norton airfield, Oxfordshire, on September 23rd, and will include the landing in Yorks of staffs to prepare the airfield for the reception of supplies and equipment arriving by air.

IN THE LEAD: As Honorary Air Commodore of No. 500 (County of Kent) Squadron, Auxiliary Air Force, Mr. Anthony Eden lately flew over Kent in the leading machine of a formation composed of the squadron's Mosquito night fighters. He is seen with personnel of the squadron, which is commanded by S/L. Pat Green, O.B.E., A.F.C.

R.A.F. Police Dogs Overseas

THE employment of R.A.F. police dogs in B.A.F.O. and Middle East Commands for the last two or three years has proved so successful that it has been decided to extend the scope of their activities to Air Command Far East. The dogs, aged from three to six, are fully trained and specially selected by the R.A.F. Police Dog School, H.Q., No. 1 Police Wing, Staverton, near Gloucester, where the air force police are now breeding their own strain of Alsatian.

The dogs at present employed in Germany and Middle East Commands are largely "locally enlisted," but it is intended to replace them when necessary with Alsatians of the Staverton strain.

Rating Pilots

THE Admiralty announces that recruiting has lately been opened for the category of Rating Pilot in the Royal Navy. During and prior to the last war, the vast majority of Naval Pilots were officers. The effect of the new announcement is that rating pilots will, in future, provide two-thirds of all the pilots in the Royal Navy. Candidates for Rating Pilot must be between 17 and 19 years of age; they must hold the School Certificate, or its equivalent, with a minimum of four passes, one of which must be mathematics; they must be of the high medical standard required of all pilots in the Royal Navy and the Royal Air Force. Suitable candidates will be offered entry into the Service as Probationary Pilot on a Continuous Service Engagement of 12 years. The training will last two years, and if a candidate should fail at any stage of the course he will have the choice of a transfer to any category of Naval Airman for which he is considered suitable; a transfer to any other category of the Royal Navy (General Service) or to the Royal Marines; or his engagement may be cancelled at his request and he may accept his discharge. A candidate who completes the course will be advanced to Pilot III, with leading rate and pay of 12s 6d a day, and appointed to a front line Squadron. He may then be advanced after three years to Pilot II, with Petty Officer rate, and after a further four years to Pilot I, with Chief Petty Officer rate. Those seeking this opportunity should apply to the Director of Naval Recruiting, Admiralty, or to any Combined Recruiting Centre.

Reunions

FOLLOWING last year's successful gathering, a reunion dinner of 150 Squadron has been arranged for Saturday, November 29th, 1947, at the Holborn Restaurant. Details from K. J. Holmes, 15, Connaught Road, Chingford, E.4.

* * *

No. 221 Squadron R.A.F. Old Comrades' Association (London, Southern and Eastern Counties) reunion will take place at the Clarence Restaurant, Whitehall, S.W., Saturday, October 4th. Further particulars from H. N. Crawshaw, 50, Elliscombe Rd., London, S.E.7.

Full Alphabetical List Giving Precis of Principal Features Being Shown on the Accessory Manufacturers' Stands

IT is a metaphoric platitude to state that a good deal of water has flowed under London Bridge during the twelve months that have elapsed since the last S.B.A.C. exhibition at Radlett. But the platitude does connote that many things have happened in the time, and although the febrile pace of the early forties is—perhaps fortunately—not being maintained now, all the many concerns which go to make up what is collectively known as the British Aircraft Industry have certainly been developing their several interests as far as they have been permitted by circumstance.

The facile view of Britain's aeronautical effort is overly concerned with the manufacture of aircraft, and whilst no one would for a moment decry the importance of this element, the magnitude of the part played by British concerns in the accessory, ancillary service and component fields throughout the world should never be left unregarded.

On nearly every stand in the Static Display can thus be seen entirely new items of interest in addition to the developments and refinements made to exhibits which were on view last year.

Exhibitors' names, addresses and stand numbers are given below in alphabetical order together with a short synopsis of their display so that users of this guide are afforded the maximum convenience.

ACCLES & POLLOCK, LTD., Oldbury, Birmingham. **(No. 13.)**
Machined and manipulated tubes, welded undercarriage tubes, welded tubular structure, engine mounting rings, tapered tubes, rifled tubes, stainless steel tubes, tubes for deicing equipment, tubular pressure bottles for supersonic aircraft, nimonic tubes for jet engines and diesel tubes.

ACTON BOLT, LTD., London, N.W.10. **(No. 155.)**
Range of Bees Brand high tensile stainless cold-headed bolts, studs, pipe unions, screws, sparking plug bodies, etc.

AEROPLASTICS, LTD., Earl Haig Road, Hillington, Glasgow, S.W.2. **(No. 62.)**
Various laminated and high-shock plastic materials for engineering applications, and also standard aircraft parts.

AIRCRAFT MATERIALS, LTD., Midland Road, London, N.W.1. **(No. 94.)**
Comprehensive range of A.G.S., B.S. and A.S. parts and components, including turnbuckles, pipe couplings, bolts, nuts, screws, wire, fork ends and shackles, flexible couplings, navigation lights and parachute metal parts. Also exhibit of "Pop" rivets and riveting tools, and a range of hand and machine sets and spinning tools for setting tubular, cup and solid rivets and eyelets.

THE AIRSCREW CO., LTD., Weybridge, Surrey. **(No. 19.)**
The "Weybridge" lightweight variable-pitch blade shown as applied to the de Havilland manually controlled hub, a fixed-pitch airscrew adapted to show three varying types of protective finish, and aircraft ventilating fans. Also wind tunnel fans and examples of "Jicwood" materials for insulated containers for food, and samples of lightweight ducting as used in the Dakota cabin for heating purposes.

AIR SERVICE TRAINING, LTD., Hamble, Southampton. **(No. 89.)**
Complete range of kitchen equipment for air liners, the design and manufacture of all types of aircraft chairs and bunks, aircraft maintenance and overhaul. Also a model of Standard Beam Approach System, an "Apollo" aircraft chair, electric oven, model of York aircraft conversion and Dye-anodising samples.

AIRWORK, LTD. 15, Chesterfield Street, London, W.1. **(No. 63.)**
Exhibits designed to show the services offered by the company, including repair and maintenance, modifications, sale and purchase, flying training, etc.; also Woodason aircraft models.

AMAL, LTD., Holford Works, Perry Bar, Birmingham, 20. **(No. 154.)**
Range of aircraft accessories, including fuel non-return valves, mechanically operated duplex and single fuel pumps, fuel pressure-regulating valves, flowmeters, flame traps, jet-calibrating machines, self-locking ball and roller joints, thermometer, oil-pocket, and cowling fasteners.

AUTOMOTIVE PRODUCTS CO., LTD., Leamington. **(No. 1.)**
Demonstration model of the "Servodyne," the Standard Pressure Fuelling Coupling, the standard power circuit on the constant pressure system, Lockheed hydraulic jacks and valves, Oleo-pneumatic shock absorber struts, arrester hook equipment, Lockheed-Avery fireproof hoses and Purolater metal element filters.

AVIATION DEVELOPMENTS, LTD., Kingsbourne House, 229-231, High Holborn, W.C.1. **(No. 145.)**
Chobert rivets, the Chobert method of tube loading rivets, Type "D" pneumatic operated equipment, also the standard range of "Pip" quick release Pins and Chobert riveters of various types.

AVIMO, LTD., Herbert Street, Taunton, Somerset. **(No. 34.)**
A pressure-resisting fire-proof pipe coupling, an electrically heated pitot head for anti-ice-accretion and a range of cameras for recording oscillograph traces with, in addition, a film assessor for examination of oscillograph trace details.

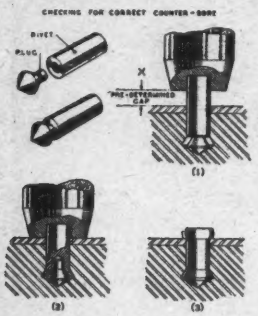
LEWIS BERGER & SONS, Homerton, London, E.9. **(No. 65.)**
Variety of examples of the wide range of surface coatings for every aspect of the aircraft industry.

THE BIFURCATED & TUBULAR RIVET CO., LTD., Aylesbury, Bucks. **(No. 77.)**
Patent riveting machine for flush riveting stressed skins and an ordinary foot-operated, automatic-feed rivet-setting machine.

BIRMETALS, LTD., Woodgate Works, Quinton, Birmingham, 32. **(No. 100.)**
Range of "Birmabright" sheet, extrusions and tubes, and various articles manufactured from these; also polished "Birmabright" sheet, coated with "Birlon" plastic coating.

BIRMINGHAM ALUMINIUM CASTING (1903) CO., LTD., Smethwick, Birmingham, 40. **(No. 76.)**
Examples of large aluminium castings, including a blower casing, and a supercharger casing for the Napier "Sabre," and, in addition,

Accessory Exhibits at Radlett . . . . .



Sequence of operations in making a "Tharra" rivet joint.

examples of gravity die castings in aluminium and magnesium, and pressure die castings in aluminium and zinc-base alloys.

BLACKBURN AIRCRAFT, LTD., Brough, E. Yorks. **(Stand A)**

Range of the patent "Tharra" rivet designed for blind or "buried" riveting, for use where a beam or member of heavy section has to be attached to plating.

THOMAS BOORN & CO., LTD., 89-91, Crescent Lane, London, S.W.4. **(No. 93.)**

"Flylite" fire-resisting hose for fuel and oil systems, and "Polypac" synthetic rubber mouldings for mechanical purposes and oil seals, etc.

JAMES BOOTH & CO., LTD., Argyle Street Works, Nechells, Birmingham, 7. **(No. 14.)**

Aluminium alloy forgings such as an aircraft centre-section and nose-wheel cylinder, aluminium alloy machined instrument-parts, and hydraulic-jack cylinder forging, wind tunnel refrigeration tubes and the Aldural rivet.

BRITISH INSULATED CALLENDER'S CABLES, LTD., Fleet Street, London, E.C.4. **(No. 55.)**

Aircraft cables, radio frequency cables, Polythylene moulded connectors, flexible waveguides for radar, aluminium sheets and section, solders and soldering fluxes and a model of a Callender-Hamilton Hangar.

BRITISH MESSIER, LTD., Cheltenham Road East, Gloucester. **(No. 39.)**

Range of undercarriages, retracting mechanisms, hydraulic pumps, jacks and other operating equipment, air compressors and pneumatic operating equipment, electrical accessories, and wheels and brakes.

BRITISH PISTON RING CO., LTD., Coventry. **(No. 9.)**

Aero engine piston and sealing rings and high duty alloy-iron castings.

THE BRITISH THOMSON-HOUSTON CO., LTD., Rugby. **(No. 12.)**

The new B.T.H. "Maxwell" precision speed indicator to give immediate indication of r.p.m. with errors not exceeding 0.1 per cent; in addition, extensive range of B.T.H. magnetos and electrical equipment for aircraft, including actuators, booster coils, A.C. and D.C. motors, switches, circuit-breaking devices, Mazda lamps and lighting equipment.

BRITISH TIMKEN, LTD., Cheston Road, Aston, Birmingham, 7. **(No. 133.)**

A range of bearings suitable for aircraft applications, including those for Dunlop landing wheels, Rotol airscrews, Napier engines, and various other components such as elevators, undercarriages and helicopter main- and tail-rotor gearboxes.

BRITISH WIRE PRODUCTS, LTD., Stourport-on-Severn, Worcs. **(No. 44A.)**

A complete range of aircraft control cables and fittings for various types of aircraft.

BROWN BROTHERS (AIRCRAFT), LTD., Houghton Road, Northampton. **(No. 136.)**

Range of A.G.S. and S.B.A.C. Standard parts, Oddie nuts, special machined parts and aircraft metals, and 5-ton aircraft hydraulic jack, also details and photographs of various types of equipment and aerodrome stores.

DAVID BROWN & SONS (HUDDERSFIELD), LTD., Park Gear Works, Huddersfield. **(No. 142.)**

High tensile steel castings, such as arrester hooks and main lighting fittings, stub axles, axle casings, wing fittings and tailwheel pivot brackets; heat-resisting steel castings comprising turbine manifolds, shroud rings, front and outer

A tail wheel pivot bracket casting in H.T. steel exhibited by the David Brown Foundries.

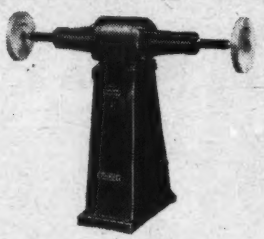
casings and jet-pipe bleed-valve bodies, and precision castings for turbine engines. Also a range of gears for aircraft use, including the Merlin internal and external spur gears, the Napier worm gears and the Bristol Brabazon internal bevel wheel, and a gear pump, cutters and floating reamers as well as the David Brown "Topograph."

W. CANNING & CO., LTD., Great Hampton Street, Birmingham, 18. **(No. 45.)**

Equipment for hard chrome deposition as used for surface hardening, reclamation, and building up of engineering components. A self-contained forced draught low voltage rectifier of the oil-immersed selenium-plate type. Alternating-current polishing-motor, ball bearing type, for two- or three-phase supply at 50 cycles.

THE CAPE ASBESTOS CO., LTD., Morley House, 26-30, Holborn Viaduct, London, E.C.1. **(No. 73.)**

Range of Capasco Plastics including special asbestos-filled compression mouldings, supplied in various forms such as sheets, tubes, angle sections and fully moulded components. A range of heat- and flame-resisting Capasco flexible and compressible materials.



Canning high-speed driving unit for mops and bobs.

CELLON, LTD., Kingston-on-Thames. **(No. 156.)**

Translucent and Metalucent lightweight finishes for all-metal aircraft, finishes for interiors, components, etc., a special display of Cellon Primer SX.44 and also scale models of civil and military aircraft.

THE CHLORIDE ELECTRICAL STORAGE CO., LTD., Exide Works, Clifton Junction, nr. Manchester. **(No. 32.)**

Exide batteries for non-aerobatic aircraft and for aerobatic civil and military aircraft, and Exide batteries for aircraft-engine ground-starting.

CHRISTIE TYLER, LTD., Seateeze Works, Bennett Street, The Trading Estate, Bridgend, Glam. **(No. 152.)**

Light aircraft seat, and luxury "Scandia" aircraft seat.

COVENTRY CLIMAX ENGINES, LTD., Widdrington Road Works, Coventry. **(No. 67.)**

Fork Lifting Truck for freight loading, etc.

RICHARD CRITTALL & CO., LTD., Aldwych, W.C.2. **(No. 52.)**

Radiant heating aircraft oven, ventilating equipment for aircraft and airport buildings, including the Stylojet air diffuser, the Stylovent air diffuser and the Deflecto grille. Also Medrae electric radiant heating panels.

CUNLIFFE-OWEN AIRCRAFT, LTD., Swaythling, Southampton. **(Stand Y.)**

Full-scale mock-up of the 14-seater "Concordia" and models of its various versions.

THE DECCA NAVIGATOR CO., LTD., 1-3, Brixton Road, London, S.W.9. **(No. 107.)**

A new model airborne receiver and direct-reading dial-unit, a demonstration of lane identification, and a receiver in actual operation on the English Chain.

THE DE HAVILLAND FORGE, LTD., Rogerstone, nr. Newport, Mon. **(No. 82.)**

Blade forgings, and light alloy, brass and aluminium forgings for general industrial purposes.

DE HAVILLAND PROPELLERS, LTD., Hatfield, Herts. **(No.6.)**

Two-blade fixed-pitch wooden de Havilland airscrew of the year 1910, a four-bladed, constant speed, feathering and braking airscrew, as used on the Viking and the Wayfarer, a feathering and braking, constant-speeding cam assembly from a three-bladed Dove airscrew, and a double-acting constant-speed unit suitable for Viking and Wayfarer installation.

DELANEY GALLAY, LTD., Vulcan Works, Edgware Road, London, N.W.2. **(No. 98.)**

Radiators, oil coolers, intercooler radiators, and light-alloy oil cooler made entirely from aluminium alloys; exhaust steam generators, cabin heating equipment, fuel tanks, stainless steel and light alloy sheet-metal work and electro-plating.

DELCO-REMY-HYATT (DIVISION OF GENERAL MOTORS, LTD.), 111, Grosvenor Road, London, S.W.1. **(No. 124.)**

A selection of F.H.P. electric motors and controllers, including high-cycle alternating motors and the split-field type of electronic applications; also a range of Wills pressure-filled joint rings.

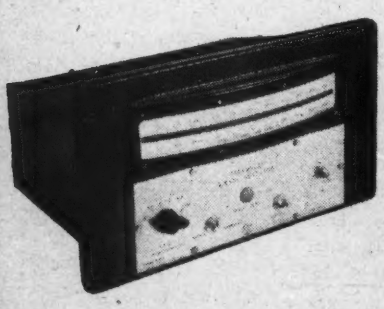
DESOUTTER BROTHERS, LTD., The Hyde, Hendon, N.W.9. **(No. 29.)**

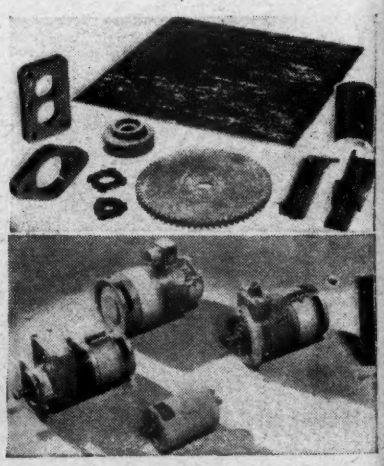
Complete range of electric and pneumatic portable tools, including the Mighty Atom series of straight drills, long- and short-reach corner drills and three types of offset drills. In addition, the more powerful Power Atom tools and rotor tools, including straight- and corner-drills, shears, grinders, nut-runners and screwdrivers.

DOCKER BROS., 177, Corporation Street, Birmingham, 4. **(No. 48.)**

Superfine finishes in most current specifications, together with one or two specialized materials, also a

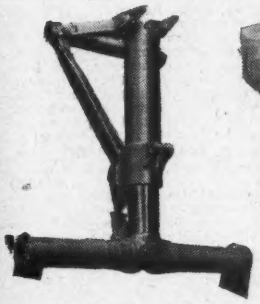
(Below) Typical examples of a wide range of Cape Asbestos "Capasco" plastics.



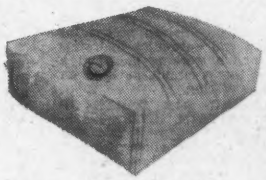


(Above) The B.T.H. "Maxwell" precision speed indicator control panel. (Centre) A Coventry Climax fork lift truck showing special pallet designed for the freight loading of cars. (Bottom right) A range of Delco-Remy motors for aircraft ancillary services.

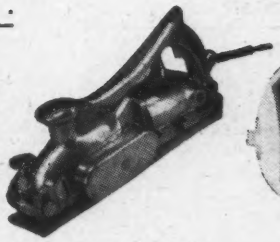
Accessory Exhibits at Radlett . . . . .



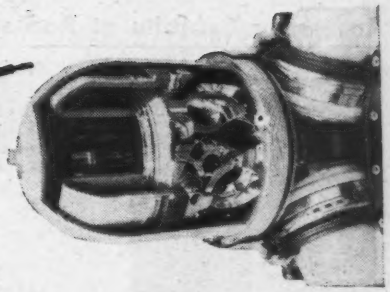
One of the exhibits by Dowty Equipment is the Brabazon I main undercarriage unit.



One of the many light-weight bag-type fuel tanks shown by Fireproof Tanks Ltd.



Thomas Firth and John Brown are exhibiting this Lowe portable electric plane.



This sectioned D.H. airscrew hub is being shown by Samuel Fox and Company (United Steel).

display of apparatus used for the testing of these materials in the laboratory. Panels finished with hot spray application of dope and metal finishes.

DOWTY EQUIPMENT, LTD., Arle Court, Cheltenham, Glos. **(No. 15.)**

Main undercarriage for Bristol Brabazon I, incorporating liquid springing; undercarriage for Fokker F.25 Promoter incorporating levered suspension and liquid springing; fuel pumps, including dual, Duplex and live-line pumps.

R. K. DUNDAS, LTD., The Airport, Portsmouth. **(No. 106.)**

Aircraft models, flying clothing, aerodrome equipment, including models and specimens of hoists, maintenance platforms, engine stands, signal pistols, lighting poles, power and distribution cables, and products of the Portsmouth factory, including the Microtimer and the Vernijigger.

DUNLOP RUBBER CO., LTD., Fort Dunlop, Erdington, Birmingham. **(No. 85.)**

The principle exhibit will be the "Compacta," tyres and wheels for the Brabazon I, showing also the pneumatically operated quadruple brakes for each wheel.

ELECTRO - HYDRAULICS, LTD., Liverpool Road, Warrington. **(No. 47.)**

Selection of model aircraft, and hydraulic, electro-hydraulic and pneumatic valves and selectors for aircraft and industrial use.

THE ENGLISH ELECTRIC CO., LTD., Queens House, Kingsway, W.C.2. **(Stand Z—1.)**

Range of electrical equipment, including D.C. and A.C. motors for actuators, similar motors with gear drives for standard hydraulic pumps, air compressors, a de-icing pump, a series of rotary actuators for fuel valves, cabin air valves, hydraulic control valves, alternators and new model generators as applied to flight controls for large aircraft.

ENGLISH STEEL CORPORATION, LTD., Vickers Works, Sheffield. **(No. 18.)**

Drop forgings for aircraft engines and a selection of engineers' small tools, including new and patented adjustable machine and hand reamers, inserted blade milling cutter, and floating machine reamer.

ESSEX AERO, LTD., Gravesend, Essex. **(No. 56.)**

Specimens of magnesium fabrication, lightweight fuel and oil tanks and aircraft components in welded magnesium alloys, and models of the Sprite aircraft.

EXACTOR CONTROL CO., LTD., 14, Berkeley Street, London, W.1. **(No. 75.)**

Fuel-flow test rig, with motor-driven pump, flowmeter, and pressure gauges and a throttle valve to vary the fuel flow; a self-sealing pipe coupling; and the Exactor "Type SL" hydraulic remote control.

THE FAIREY AVIATION CO., LTD., Hayes, Middx. **(Stand M.)**

S.B.A.C. standards comprising filler cap, drain valves, a range of pressed end clips and quick-release pins; also Fairey hydraulic power-assisted flying control, precision tube sizers, recessing tool, clamps and fasteners.

FERODO, LTD., Chapel-en-le-Frith, Stockport. **(No. 99.)**

Display of Ferobestos Technical Plastics, with exhibits such as bushes, bearings, piston rings, valve discs and seatings, gears, cams, and aircraft flooring, panels, engine mountings, etc.

FERRANTI, LTD., Hollinwood, Lancs. **(No. 150.)**

The hyperbolic navigational computer, also the new gyroscopic gun sight in which calculations and estimations of range, crossing speeds or windage effect are automatically computed.

FIELD AIRCRAFT SERVICES, LTD., 22, Progress Way, Purley Way, Croydon, Surrey. **(No. 83.)**

A new type of aircraft passenger seat, and also photographs of the aircraft engine and servicing divisions.

FILTON, LTD., The Wharf, Clapham Street, Leamington Spa. **(No. 130.)**

Range of bellows, glands and oil seals and samples of mirror finish on glands and other articles.

A carbon sealing-face bellows-gland exhibited by Filton, Limited.

FIREPROOF TANKS, LTD., The Airport, Portsmouth. **(No. 91.)**

A variety of Cimatrol flexible bag-type fuel tanks with self-sealing coverings.

FIRESTONE TYRE & RUBBER CO., LTD., Great West Road, Brentford. **(No. 129.)**

Range of tyres of various sizes, a radio mounted on an oscillating fuselage, vibration-insulated by Firestone bonded rubber-to-metal dampeners, and a panel displaying Firestone bonded rubber-to-metal products.

THOS. FIRTH & JOHN BROWN, LTD., Atlas & Norfolk Works, Sheffield, 1. **(No. 141.)**

Aircraft parts made in Firth Brown steels, selection of Firth Brown engineers' cutting tools, also the Lowe portable electric plane and an all-electric grinder.

FIRTH VICKERS STAINLESS STEELS, LTD., Staybrite Works, Sheffield, 9. **(No. 34.)**

Stainless and heat-resisting steels for aircraft in the form of bars, sheet, strip, centri-die-cast and centrifugally cast components for reciprocating engines and gas turbines.

FISCHER BEARINGS CO., LTD., Upper Villiers Street, Wolverhampton. **(No. 132.)**

Standard range of FBC ball and roller bearings and special types of bearings for aircraft and jet engines.

W. T. FLATHER, LTD., Standard Steel Works, Sheffield. **(No. 8.)**

Sectionalized Armstrong-Siddeley "Cheetah" engine, showing those parts manufactured from Flather steel with examples of steel fractures showing the core.

FLIGHT REFUELLING, LTD., St. Nicholas, Littlehampton. **(No. 117.)**

Refuelling models and equipment, photographic display showing development of flight refuelling, and samples of Mark XI shut-off valve.

SAMUEL FOX & CO., LTD., Westbourne Road, Sheffield, 10. **(No. 29.)**

Aircraft parts and components, including jet engine exhaust unit, jet engine pipe, de Havilland hub for variable pitch airscrew, and five cylinder mock-up of the Bristol Hercules radial engine.

The Churchill observer-type harness jacket with detachable breast pack will be shown on the G.Q. Parachute Company's stand.

THE GENERAL ELECTRIC CO., LTD., Kingsway, London. **(No. 144.)**

A 1.5 kW airport location- or course-marking beacon giving two high intensity beams, suitable for use in all climates and in situations where regular maintenance is difficult. An airfield lighting control panel carrying a mimic display of the field and approach lights together with the requisite selector switches to control all the lighting facilities. The G.E.C. Air Circulation Oven for cooking frozen meals in aircraft, in one-third the time normally required. A miniature airborne VHF transmitter/receiver weighing 8½lb for installation in light aircraft. A display of aircraft wiring cables in a range of standard sizes, and other items including switchboards, etc., and the G.E.C. internal telephone for use in sound-proofed aircraft to displace intercomm.

F. GILMAN (B.S.T.), LTD., Carlton House, 125, High Street, Smethwick, 41. **(No. 139.)**

Range of portable flexible drive machines, including the "Skatoskalo" machines for tube and surface cleaning and the removal of rust and paint from structural steelwork; also the range of "Multiflex" machines for grinding, drilling, wire brushing and polishing and a selection of "Titegrip" rotary milling cutters and rotary files.

GIRLING, LTD., Kings Road, Tyseley, Birmingham. **(No. 28.)**

Mechanical brakes for aircraft wheels and a self-adjusting hydraulically operated brake for light and medium aircraft.

SIR GEORGE GODFREY & PARTNERS, LTD., Hampton Road, Hanworth, Middlesex. **(No. 119.)**

Air cooling unit for use in pressurized aircraft, which consists of a centrifugal blower further compressing the air of the cabin and delivering it to an intercooler where, after cooling, it returns to a turbine driving the cabin blower, in so doing extracting energy from the air and cooling it to a predetermined level.

GOODYEAR TYRE & RUBBER CO., LTD., Wolverhampton. **(No. 101.)**

A 64in size 22×10.00-15 aero tyre, mounted on a wheel, a demonstration fixture showing the hydraulically operated single disc brake in size 24×7; and another fixture showing the mechanically operated single disc brake in size 6.00-6.

THE G.Q. PARACHUTE CO., LTD., Stadium Works, Woking, Surrey. **(No. 25.)**

Flying equipment consisting of the Churchill harness-jacket, observer, pilot, paratroop, and glider-troop parachutes and safety harness.

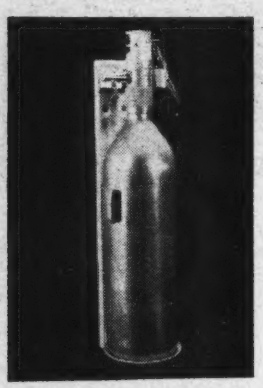
GRAVINER MANUFACTURING CO., LTD., Graviner Works, Gosport Road, Nr. Fareham, Hants. **(No. 134.)**

Complete range of fire-fighting equipment, including a light-alloy cabin and freight water extinguisher and a new light weight all-metal high-temperature fire detector.

GUEST, KEEN & NETTLEFOLDS, LTD., Heath Street, Birmingham, 18. **(No. 102.)**

Various kinds of wood screws, in steel and brass and aluminium alloy, aircraft bolts and nuts, set screws, "Aerotight" nuts, rivets, Nettlefolds-Parker-Kalon hardened self-tapping screws, hammer drive

Accessory Exhibits at Radlett . . . . .



A Graviner hand-type fire extinguisher for cabin use.

screws, cold forged socket screws, Nettlefolds-Patent-Phillips recessed head screws and other fastenings for aircraft.

J. J. HABERSHON & SONS, LTD., Holmes Mills, Rotherham. **(No. 151.)**

Coils of different sizes to various D.T.D. specifications, hardened and tempered "T" sections to specification D.T.D. 331, assembly of test booms incorporated in the Gloster Meteor Mark IV and fittings and spar manufactured from strip material.

JOHN HALL & SONS (BRISTOL & LONDON), LTD., 1, Cadogan Road, Hengrove, Bristol, 4. **(No. 22.)**

Examples of specialized finishes for aircraft components, improved forms of heat resisting materials, and a variety of surfaces obtainable with wrinkle-finishes varying from coarse, glossy finish to fine, matt pattern.

HARLEY AIRCRAFT LANDING LAMPS, Paxton Hill, St. Neots, Hunts. **(No. 57.)**

Range of Harley Airborne Landing Lamps, as well as a portable flood-light for aerodrome illumination, and an emergency lighting set.

THOS. P. HEADLAND, LTD., Westminster Bridge Road, London, S.E.1. **(No. 71.)**

The "Dzus" Spiral Cam self-locking fastener; demonstration of the torsion wrench for cylinder head bolts, etc., also the "Bully" riveting hammer; "Promontory" welding torch, regulators and other welding equipment; range of A.G.S. and special machined parts.

HIGH DUTY ALLOYS, LTD., Buckingham Avenue, Trading Estate, Slough, Bucks. **(No. 90.)**

Representative range of aircraft components manufactured in aluminium and magnesium alloys; examples of compressor and turbine bladings in Hiduminium, aluminium bronze and Nimonic 80, also specimens of impellers and rotor drums and components for jet engines.

H. M. HOBSON, LTD., Hobson Works, Fordhouses, Wolverhampton. **(No. 146.)**

A number of exhibits, including the Hobson-R.A.E. Injection Carburettor as fitted to the Bristol Centaurus 57 engine, and Hercules 230 engine, Hobson carburettors fitted to various other aircraft engines, an ignition control unit, supercharger gear change unit, cockpit engine controls for different types of aircraft and the Hobson power-operated flying control.

THE HOFFMANN MANUFACTURING CO., LTD., Chelmsford, Essex. **(No. 40.)**

Napier Sabre supercharger impeller, sectioned artificial horizon, by the Sperry Gyroscope Co., a Sperry directional Gyro, all mounted on Hoffman ball bearings, a selection of Hoffmann gyro bearings, bearings for various types of aircraft engines and airscrews, Hoffmann bearings for aircraft controls and landing wheels, Hoffmann roller gauges, and steel rollers and steel balls in graduated sizes.

HORDERN-RICHMOND, LTD., The Aerodrome, Haddenham, Bucks. **(No. 53.)**

Three helicopter tail rotors in Hydulignum, a fixed pitch airscrew as used on the Moth, a variable pitch Seafire airscrew in Hydulignum, a blade for an extractor fan and various press tools in Hydulignum.

F. A. HUGHES & CO., LTD., Abbey House, Baker Street, London, N.W.1. **(No. 122.)**

Elektron magnesium alloy sheet, extrusions, castings, and forgings, including range of zirconium alloys.

HENRY HUGHES & SON, LTD., Husun Works, New North Road, Barkingside, Essex. **(No. 3.)**

Range of aircraft instruments, including the Air Position Indicator, Ground Position Indicator, the Periscopic Drift Sight, Inverted Astro Compass, Electric Turn and Slip Indicator, Air Driven Turn and Slip Indicator, various types of air sextants and gyro magnetic compasses.

THE HYMATIC ENGINEERING CO., LTD., Redditch, Worcs. **(No. 97.)**

Range of pneumatic and compressed air equipment for aircraft including latest type for 1,000 lb/sq in output, tools and compressors, and a loaded pneumatic system in operation.

IMPERIAL CHEMICAL INDUSTRIES, LTD. (PAINTS DIVISION), Wexham Road, Slough. **(No. 148.)**

Range of aircraft finishes for service and civilian types, and models of the Vickers Viking, Short Solent and Miles Gemini. The complete range includes clear and pigmented finishes for external Alclad. "Necol" glossy cellulose finishes for interior decoration, "Pyrobel" non-inflammable dopes and finishes, "Dulux" glossy synthetic enamel for external identification and interior decoration and protective lacquers for aluminium and Perspex.

IMPERIAL CHEMICAL INDUSTRIES, LTD. (PLASTICS DIVISION), Welwyn Garden City. **(No. 143.)**

A double skin hood and double skin window in clear Perspex acrylic sheet, various types of light fittings, wash basins and tableware, and several examples of "Welvic" grade of P.V.C. and "Alkathene" brand extrusions.

Among the many examples of cast work by High Duty Alloys is this air intake for the D.H. Goblin.

IMPERIAL CHEMICAL INDUSTRIES, LTD. (METALS DIVISION), Witton, Birmingham. **(No. 153.)**

Aluminium alloy sheet, strip, tubes and extrusions, together with copper, brass, bronze and cupro-nickel wire. Other exhibits are pressings in copper and brass for the manufacture of fire extinguishers and oxygen bottles; and radiator tubes for aircraft in aluminium, copper and brass.

INTEGRAL, LTD., G.P.O. Box 7, Cousins Street, Dudley Road, Wolverhampton. **(No. 72.)**

High and low pressure engine-driven hydraulic pumps for undercarriage and general service operation, electrically driven pumps for feathering and auto-pilot hydraulic supply, and a working model of a hydraulic pump circuit as used on the Vikers Viking.

THE IRVING AIR CHUTE OF GREAT BRITAIN, LTD., Letchworth, Herts. **(No. 17.)**

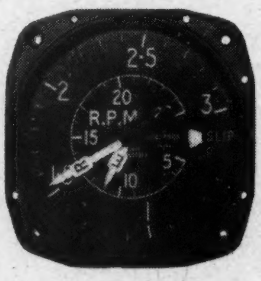
Range of Irvin air chutes for Service and civilian use, including the Irvin Chair Chute for commercial aircraft, and the seat pack, quick-connector and flexible back pack types for Service aircraft.

I.T.D., LTD., 29, Palace Gate, London, W.8. **(No. 43.)**

Trucks and loading equipment for various kinds of freight.

JABLO PROPELLERS, LTD., Mill Lane, Waddon, Croydon, Surrey. **(No. 109.)**

Range of blades for Jablo compressed-wood fixed-pitch airscrews; press tools and jigs manufactured from densified laminated materials; paper and fabric-based insulating materials; densified laminated hollow structure for flooring and partitions, etc.



Among new instruments by Kelvin, Bottomley and Baird is the helicopter tachometer.

JENSON & NICHOLSON, LTD., Jenson House, Carpenter's Road, London, E.15 **(No. 78.)**

Number of panels showing various finishes for aircraft including exterior finishes to approved specifications, cellulose and synthetic lacquers, interior decorative finishes, wood finishes, insulating varnishes, dial enamels, and wood and fabric preservatives.

KELVIN, BOTTOMLEY & BAIRD, LTD., Kelvin Works, Basingstoke. **(No. 31.)**

Wide range of aircraft instruments comprising, and introducing for the first time, a machmeter, low-range air speed indicator, large- and small-range engine speed indicators, helicopter tachometer with clutch slip indicator, synchroscope, dashboard compass, accelerometer, and a pressure unit for pilotless aircraft.

KING AIRCRAFT CORPORATION, High Street, Renfrew. **(No. 11.)**

Various aircraft components, including flush-fitting door lock, oil filter, self-sealing coupling, flush-fitting toggle fastener, hydraulically operated Sutton harness release gear, feed line strainer for oil and fuel systems, pipe couplings, drain valves and a range of S.B.A.C. Standard components.

K.L.G. SPARKING PLUGS, LTD., Putney Vale, London, S.W.15. **(No. 5.)**

Sectioned and complete examples of various types of aircraft sparking plugs with "Corundite" insulators; ignition harness accessories including extension units developed for Rolls-Royce, Bristol and Napier engines; exhibits of special equipment for gas turbines; igniter plugs for Rolls-Royce and de Havilland turbines, and thermo-couples for the measurement of jet temperatures.

LATEX UPHOLSTERY, LTD., 41, Lonsdale Road, London, W.11. **(No. 38.)**

Examples of aircraft passenger seats upholstered in various styles, and, in addition, examples of cellular rubber and rubberized-hair upholstery fillings.

LINREAD, LTD., Sterling Works, Cox Street, Birmingham, 3. **(No. 88.)**

Range of aircraft bolts, screws and rivets, together with samples of specialized precision repetition products.

LLEWELLYN RYLAND, LTD., Balsall Heath Works, Haden Street, Birmingham, 12. **(No. 7.)**

Range of aircraft paints, cellulose dopes and lacquers, varnishes, jointing compounds, and durable finishes for interior fitments.

LODGE PLUGS, LTD., Rugby. **(No. 27.)**

Sparking plugs with "Sintox" insulation for British, American and other engines, screening harness terminal fittings, and sparking plug maintenance and servicing equipment.

JOSEPH LUCAS, LTD., Great King St., Birmingham, 19. **(No. 24.)**

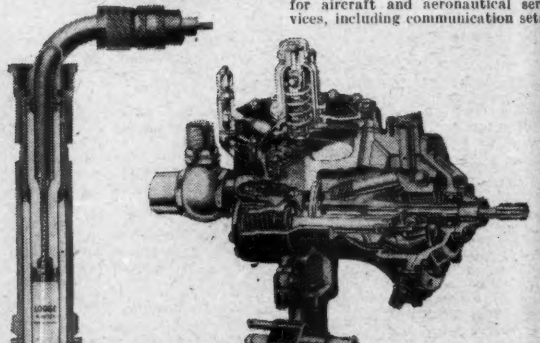
A full range of sectioned fuel equipment components for gas turbines, together with working models of complete fuel systems. Among the combustion assemblies shown is a series of flame tubes illustrating the progress made in efficiency and simplification of design.

MAGNESIUM ELEKTRON, LTD., Abbey House, Baker Street, London, N.W.1. **(No. 123.)**

As an associate of F. A. Hughes and Co., Ltd., the exhibits will be of a similar character; with emphasis on the Zirconium alloys.

MARCONI'S WIRELESS TELEGRAPH CO., LTD., Marconi House, Chelmsford. **(No. 96.)**

Wide range of radio equipment for aircraft and aeronautical services, including communication sets



(Above) This part-sectioned exhibit shows the interior details of a Joseph Lucas fuel pump. (Left) A Lodge "Sintox" plug of the type exclusively fitted to Centaurus and Hercules engines.

for the MF, HF, and VHF bands, and navigational aids of advanced design. The new Marconi Automatic Radio Compass, and a unit localizer and marker receiver for use with the standard 7-metre beam approach system. The display of communications equipment includes the Marconi A.D. 97/108 airborne set and a range of voltage regulator units and a VHF receiver designed for the reception of amplitude- or frequency-modulated signals.

MARSTON EXCELSIOR, LTD., Wolverhampton. **(No. 149.)**

Light-alloy heat exchangers and "Marflex" flexible fuel cells.

MARTIN-BAKER AIRCRAFT CO., LTD., Higher Denham, Middx. **(No. 106A.)**

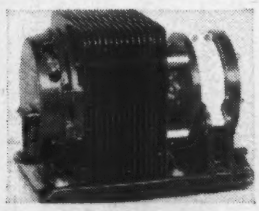
A Martin-Baker ejector seat, Martin Patent Flat Feed for 20 mm. cannon and a Martin Patent Centrifugal Oiling Unit for the translational bearing of contra-rotating airscrews.

METROPOLITAN PLYWOOD CO., 18, 30, Leonard Street, London, E.C.2. **(No. 36.)**

Aircraft plywood in boards and mouldings, etc., metal-faced plywood, composite boards and laminated plastic mouldings and sheets.

METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester, 17. **(Stand S.)**

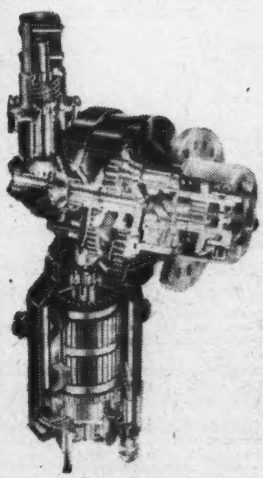
Metrovik and Cosmos lamps, many specially designed for aircraft use, including the new 15-20-watt tubular fluorescent lamps. There will also be specimens of the latest infra-red 250-watt lamps in which the reflector is embodied in the lamp.



One of Newton Brothers automatic voltage and current regulators.

MINISTRY OF SUPPLY. (Nos. 50 & 51.)

Display showing the work of the Ministry's various experimental establishments, namely—the Royal Aircraft Establishment, the Marine Aircraft Experimental Establishment, the National Gas Turbine Establishment and the Empire Test Pilots' School.



This sectionalized example of the Alvis Leonides starter motor is shown on the Rotax stand.

MONACO MOTOR & ENGINEERING CO., LTD., High Street, Watford. **(No. 54.)**

Exhibit of the Monaco Tap Extractor for the removal of broken taps, drills, etc., without damage to components or threads.

MOND NICKEL CO., LTD., Grosvenor House, Park Lane, London, W.1. **(No. 106.)**

Range of exhibits showing applications of nickel alloys in aircraft construction, particularly their application to gas turbine engines, and with special attention to the "Nimonic" series, including Nimonic 80, Nimonic 75 and Inconel exhaust manifolds.

NEWTON BROTHERS (DERBY), LTD., Alfreton Road, Derby. **(No. 33.)**

Aircraft engine-driven generators of various types, including a dual-purpose generator providing both A.C. and D.C. high-frequency outputs, a series of various types of automatic voltage regulators and Newton Derby rotary transformers.

NORMALAIR, LTD., West Hendford, Yeovil. **(No. 59.)**

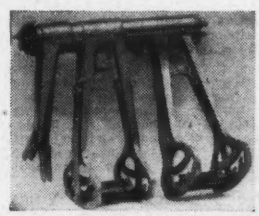
Latest developments in the Normalair system of cabin air control, a diagram of the Normalair cabin air control system to be installed in the Bristol Brabazon I, a Flight Engineer's panel as fitted to the Tudor II, a master control unit and discharge valve as fitted to the Tudor I, thermal delay, switch, humidifier and water pump, and a non-return valve to be installed in the Brabazon I.

NORTHERN ALUMINIUM CO., LTD., Banbury, Oxon. **(No. 18.)**

A general scheme designed to show the rolling, extruding, forging and casting operations of aluminium, modelled in relief on a plaster background.

ODDIE FASTENERS, LTD., Plaza Hall, Portswood Road, Southampton. **(No. 37.)**

A series of examples of the applications of Oddie fasteners to various aircraft components, including engine cowlings, access doors, fairings, inspection covers, wiring, etc.



A typical rudder control pedal unit made by Rubery Owen and Co.

THE PALMER TYRE, LTD., Herga House, Vincent Square, London, S.W.1. **(No. 116.)**

Display of undercarriage equipment, various examples of products such as gun-firing gear, pneumatic rams, reducing valves, and a new single-disc brake comprising a heat-resisting polished disc keyed to the wheel but floating axially. When running free, the disc brushes, with negligible friction, the padded inner faces of a pneumatic or hydraulic clamp anchored to the axle. A feature of this brake is its manufacture from a non-conductive textile friction material.

PETO & RADFORD, LTD., 50, Grosvenor Gardens, London, S.W.1. **(No. 121.)**

A wide range of lead-acid accumulators designed for starting, lighting and radio in aircraft, including a complete ground starter trolley, ground starter batteries, and civil aircraft batteries, all the batteries being fitted with Porvic micro-porous plastic separators.

THE PLESSEY CO., LTD., Ilford, Essex. **(No. 35.)**

Selected range of aircraft accessories, including aero engine cartridge starters and cartridge breeches, actuators, plugs and sockets, ignition harness, wiring systems, various pumps and portable crimping pliers for making solderless connections to cables.

RANSOME & MARLES BEARING CO., LTD., Newark-on-Trent. **(No. 112.)**

Series of exhibits of representative bearings, comprising single- and double-row ball journals suitable for engines and controls, single-row journal bearings for crankshafts, and needle roller bearings including cartridge type bearings with pre-assembled rollers.

REID & SIGRIST, LTD., Walton Lodge, Kirby Muxloe, near Leicester. **(Stand G.)**

The Standard Mark 1A turn and bank indicator, new type turning indicator, Bubble Inclo turning indicator in 3¼in S.A.E. case, electronic dynamic balancer, the "R & S" optical projector, the combined gyro instrument test apparatus, the new "Reid" 35 mm miniature precision camera, and the "R & S" 35 mm photographic enlarger.

RENFREW FOUNDRIES, LTD., Hillington, Glasgow, S.W.2. **(No. 138.)**

Aero engine castings in sand, gravity-die and press-die; jet engine castings, and a front gear for the Bristol Aeroplane Co.

THE RENOLD & COVENTRY CHAIN CO., LTD., Renold Works, Didsbury, Manchester. **(No. 135.)**

Range of chains, sprockets, cable spools, connectors and biplanar blocks for aircraft control systems.

REYNOLDS TUBE CO., LTD., Hay Hall Works, Tyseley, Birmingham, 11. **(No. 95.)**

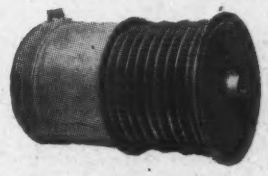
Seamless steel tubes and manipulations, including a Bristol engine mounting; also Hiduminium tubing, sections, sheet and strip.

R.F.D. CO., LTD., Stoke Road, Guildford, Surrey. **(No. 44.)**

Life-saving jacket in one universal size to fit adults and children, fitted with torch and whistle for identification purposes, a full-size 15/18-seater dinghy and a 20/24-seater dinghy.

ROTAX, LTD., Willesden Junction, London, N.W.10. **(No. 23.)**

Electrical systems and equipment designed for civil aircraft, a working demonstration panel showing the rectified A.C. system for the Handley Page "Hermes," ignition equipment, electric actuators, starter motors for aircraft engines, D.C. and A.C. motors and generators, rotary transformers, lighting equipment and switches.



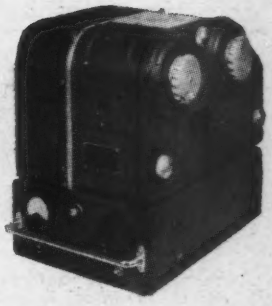
A Serck radial flow oil cooler with matrix partially withdrawn for examination.

ROTOL, LTD., Cheltenham Road, Gloucester. **(No. 114.)**

Full-size "Viking" type four-bladed airscrew; sectioned two-bladed constant-speed, feathering airscrew, auxiliary gear box for Tudor II and Hermes fitted with Marshall cabin blower, generator and other auxiliaries. Also sectioned six-drive gear box and Meteor-type gear box; three-bladed constant-speed feathering and braking airscrew; demonstration unit of Rotol synchronising equipment; examples of other Rotol airscrews of varying types are exhibited on the stands of the chief engine manufacturers.

RUBERY, OWEN & CO., LTD., Darlaston, South Staffs. **(No. 46.)**

Range of aircraft components, including control columns, landing and tail wheel forks, engine mounting ring, Rotol airscrew hub, and hydraulic valve assemblies.



A six-channel recording camera by Savage and Parsons for use with strain gauge equipment.

L. A. RUMBOLD & CO., LTD., Kilburn, London, N.W.6. **(No. 57.)**

Exhibits of aircraft furniture, including a number of seats and a special folding passenger chair for use in freight-carrying aircraft.

SALFORD ELECTRICAL INSTRUMENTS, LTD., Peel Works, Silk Street, Salford, 3, Manchester. **(No. 88.)**

A new G.E.C. radio compass designed for use in modern high-speed aircraft to determine position and course and to provide homing. This is the first British device of its kind and has officially been adopted as the standard radio compass for the R.A.F.

SANGAMO WESTON, LTD., Great Cambridge Road, Enfield, Middlesex. **(No. 56.)**

Electrical engine, air, oil and radiator temperature indicators, wattmeters, ammeters, voltmeters, portable test instruments and indicators for navigational aids.

SAUNDERS VALVE CO., LTD., Cwmbran, Monmouthshire. **(No. 69.)**

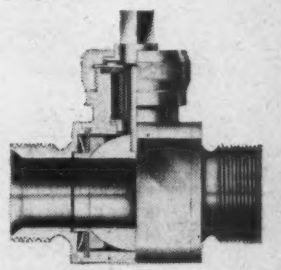
Range of sizes and types of the glandless plug cock, with sectioned and working models and electrical and manual actuation demonstrations, and a selection of Saunders diaphragm valves.

SAVAGE & PARSONS, LTD., Watford, Herts. **(No. 140.)**

Strain gauge equipment, including the 600 way high-speed recorder, 50 way manually operated equipment, multi-range bridge, galvanometers and valve-maintained tuning forks.

SELF-PRIMING PUMP & ENGINEERING CO., LTD., Edinburgh Avenue Trading Estate, Slough, Bucks. **(No. 113.)**

Wide variety of fuel booster pumps for all types of aircraft, combined inverted flight valves, non-return valves, float valves, water/methanol injection pumps, hand pumps and cabin heater pumps.



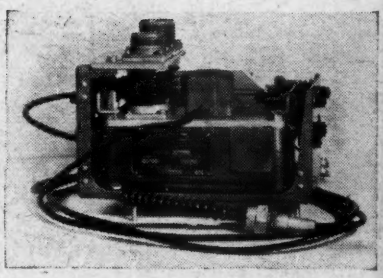
Saunders diaphragm glandless plug cock.

SERCK RADIATORS, LTD., Warwick Road, Birmingham, 11. **(No. 104.)**

"Serck" radial-flow oil cooler of new design embodying such features as a detachable matrix

Accessory Exhibits at Radlett . . . . .

A new Smith's flying instrument is the air-driven artificial horizon, which employs a radically charged method of presentation.



(Above) Among the Tufnol exhibits are control cable pulleys with plain and ball type bearings. (Right) A thermostatic engine control for coolant, oil or air temperature regulation is exhibited by Teddington Controls Ltd.

with special provision for cleaning and servicing and for expansion of the matrix relative to the casing.

SHORT & MASON, LTD., Aneroid Works, Macdonald Road, Walthamstow, London, E.17. **(No. 30.)**

Aircraft and meteorological instruments and industrial temperature control apparatus.

SIMMONDS AEROCESSORIES, LTD., Treforest, Nr. Pontypridd, Glamorgan. **(No. 16)**

Comprehensive range of self-locking nuts and fastenings; elastic stop nuts, Pinnacle metal-diaphragm nuts, Spire tension-lock nuts, fixings and clips, Simmonds cowling clips, Simmonds-Corsey controls, Fram oil and engine cleaner, and Pacitor contents gauge.

THE SKEFKO BALL BEARING CO., LTD., Luton. **(No. 49)**

Range of the SKF bearings for aircraft, SKF control pulleys, and the SKF standard type bearings for manufacturing plant and equipment and for airport control and aircraft maintenance.

Ultra Walter Mark III air/sea rescue radio equipment is shown on the Ultra Electric stand.

SKYHI, LTD., "Skyhi" Works, Worton Road, Isleworth, Middlesex. **(No. 125.)**

Aircraft jacks, high pressure hose units, inhibitor spray gun, portable wheel-changing jacks.

SMITHS AIRCRAFT INSTRUMENTS, LTD., Cricklewood Works, London, N.W.2 **(No. 4.)**

The new S.E.P. 1 automatic pilot employing the novel operational principle of rate/rate control. A representative range of instruments, new among which are the air-driven artificial horizon and directional gyro, both employing new forms of presentation. The Smiths ice detector system and the "Desynn" remote indication system are also shown together with a range of special test equipment which should appeal strongly to overseas operators.

SMITHS STAMPING WORKS (COVENTRY), LTD., Ribble Road, Coventry. **(No. 41.)**

Representative selection of aircraft drop forgings in steel and light alloys.

SOUTHERN FORGE, Ltd., Langley, Bucks. **(No. 127)**

A range of aluminium alloy extrusions produced on the exhibitor's new 3,500-ton extruder, and, in addition, a wide selection of aluminium alloy forgings for aircraft engines and airframes.

THE SPERRY GYROSCOPE CO., LTD., Great West Road, Brentford. **(No. 115)**

The Sperry Gyrosyn compass Mark IV B, mounted in operation in a model aircraft, the Sperry electrical horizon, suitable for high altitude or aerobatic aircraft, the model shown being the prototype; the Sperry Comverter, for the conversion of 24-volt D.C. supply in aircraft into 115-volt 3-phase 400 cycles A.C. supply for the operation of electronic equipment; and the new Sperry Pilot Aid—a lightweight automatic pilot for aircraft up to 15,000 lb all-up weight.

STANDARD TELEPHONES & CABLES, LTD., Connaught House, 63, Aldwych, London, W.C.2. **(No. 80.)**

A range of radio communication equipment designed for airborne use.

STERNOL, LTD., Royal London House, Finsbury Square, London, E.C.2. **(No. 81)**

Sternocleanse anti-dermatitis cream and samples of Sternocore foundry compounds.

STERLING METALS, LTD., Coventry. **(No. 26)**

Specimens of light alloy castings in aluminium and elektron magnesium alloys, including supercharger and diffuser casings, air intakes and other assemblies for jet and piston engines and airframes.

J. STONE & CO., LTD., The Charlton Foundries, Charlton. **(No. 131)**

A number of castings for airframe and engine components, including two large sand castings for Messrs. A. V. Roe and Napiers, gravity and pressure die castings in elektron-magnesium and aluminium alloys, and examples of sand castings in magnesium-cerium-zirconium and magnesium-zinc-zirconium alloys.

On the Sperry stand can be seen the gyro unit and indicator of the Mk IVB Gyrosyn compass.

TECALEMIT, LTD., Great West Road, Brentford, Middlesex. **(No. 60)**

Examples of aircraft lubricating hand guns, micro pumps, Tecalemeters for the measurement of petroleum, etc., high pressure greasing drum pump, lubricating oil filters and lubricating nipples.

TEDDINGTON CONTROLS, LTD., Cefn Coed, Nr. Merthyr Tydfil, S. Wales. **(No. 128)**

Range of instruments for the control of temperature and pressure, including pneumatic jacks and valves, hydraulic valves, inching controls developed for temperature regulation of coolant, oil and cabin air systems.

TIPSY AIRCRAFT CO., LTD., Elmwood Avenue, Feltham, Middlesex. **(No. 61)**

Portable equipment for the film industry, examples of aircraft components, photographs of the Tipsy aircraft and equipment for the projection of still pictures from film strip or small slides.

TITANINE, LTD., Colindale, London, N.W.9. **(No. 126)**

Range of aircraft finishes, including Titanine special feather-weight finish for metal aircraft, satin finish scheme T.T.6, finishes for Service and civil aircraft, finishes for internal use on aircraft and special non-inflammable scheme, etc.

T.K.S. (AIRCRAFT DE-ICING), LTD., Drayton House, Gordon Street, London, W.C.1. **(No. 110)**

A complete working model of the T.K.S. aircraft de-icing system, sectional models of electrical and mechanical components and examples of sectioned distributors.

TRIPLEX SAFETY GLASS CO., LTD., Albemarle Street, London, W.1. **(No. 21)**

Examples of safety glass components, including bird-proof windscreen, Triplex "M" panels for the Avro Tudor II, bullet-proof windscreen with dry-air sandwich on back for Gloster Meteor, pressure cabin window, window coaming for the Concordia, air driers for double-skin panels, and toilet compartment fittings for aircraft.

TRUCAST, LTD., 55, Pall Mall, London, S.W.1. **(No. 111)**

Compressed rotor and stator blades for gas turbine engines in stainless steel and various heat-resisting materials; also examples of wax injection dies for making wax models for precision casting.

TUFNOL, LTD., Perry Barr, Birmingham, 22B. **(No. 92)**

Display of Tufnol sheets, tubes, rods, bars, angles and channels and components moulded and machined from Tufnol to accurate limits, including an aerial mast and loop aerial housing, wheel discs, instrument cases, brackets, guides, fairleads, cable guards, bearings, pulleys, gear wheels, etc.

TUNGUM SALES CO., LTD., Brandon House, Painswick Road, Cheltenham. **(No. 147)**

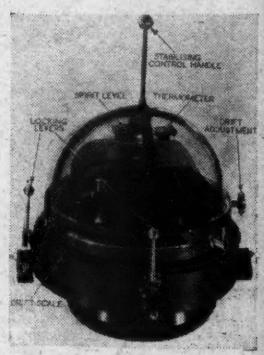
Applications of Tungum alloy shown in the form of tube, bar, rod, sheet, strip and wire, together with examples of gauzes, wire ropes, springs and castings. In a separate section may be seen aircraft pipes, plumbing units and components for general engineering purposes.

ULTRA ELECTRIC, LTD., 62, Buckingham Gate, London, S.W.1. **(No. 105)**

Air/Sea rescue equipment, battery-driven transmitter, and aircraft intercommunication control equipment of two types.

A. H. VANE & CO., Empire House, St. Martin's-le-Grand, London, E.C.1. **(No. 137)**

Textile materials for use in aircraft construction, including linen and cotton fabrics and serrated tapes, nylon and cotton fabrics for man-carrying and supply-dropping parachutes, linen sewing thread and flax cordage, silk fabric for electrical insulation, etc.



The O.S.C.-1 air survey camera, made by the Williamson Manufacturing Co., Ltd.

VOKES, LTD., Guildford, Surrey. **(No. 118)**

Air intake filters for aircraft, fuel filters of various types, including the low-pressure fuel-oil filter fitted to the de Havilland Goblin and Ghost engines; also a range of flame dampers, filters for cabin blowers, and air straighteners.

WELLWORTHY PISTON RINGS, LTD., Lymington, Hants. **(No. 120)**

A wide range of compression, scraper, oil-seal and retaining rings, pistons machined from forgings and castings for various aircraft manufacturers, "Wellseal" engine-sealing compound and photographs of sectioned Centaurus engines.

WILLIAMSON MANUFACTURING CO., LTD., Litchfield Gardens, Willesden Green, London, N.W.10. **(No. 2)**

The Williamson Photogrammetric air survey camera, the Williamson Eagle IX survey camera, and various reconnaissance, Service type cameras, also the Williamson-Roass mapping equipment and Williamson precision automatic enlarger.